Milltown Reservoir Sediments Operable Unit

of the Milltown Reservoir/Clark Fork River Superfund Site

Record of Decision

U.S. Environmental Protection Agency Region 8

10 West 15th Street
Suite 3200
Helena, Montana 59626

December 2004

RECORD OF DECISION

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December 2004

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 8, MONTANA OFFICE

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December 2004

Issued by:

U.S. Environmental Protection Agency Region 8

10 West 15th Street, Suite 3200, Helena, Montana 59626

With Support from:

CH2M HILL, Inc.

700 Clearwater Lane

Boise, Idaho, USA

Milltown Reservoir Sediments Operable Unit

of the Milltown Reservoir/Clark Fork River Superfund Site

Record of Decision

Part 1: Declaration

U.S. Environmental Protection Agency Region 8

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Contents

1 Declaration

1.1 Site Name and Location

Site Name:	Milltown Reservoir Sediments Operable Unit of the Milltown Reservoir/Clark Fork River Superfund Site
CERCLIS Identification Number:	MTD980717565
Site Location:	Missoula County, Montana

1.2 Statement of Basis and Purpose

This decision document presents the Selected Remedy for the Milltown Reservoir Sediments Operable Unit (MRSOU) of the Milltown Reservoir/Clark Fork River Superfund Site, near Milltown, Montana. The Selected Remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record file for this site.

The State of Montana concurs with the Selected Remedy. The U.S. Fish and Wildlife Service (USFWS) of the U.S. Department of the Interior (DOI) and the Confederated Salish and Kootenai Tribes also concur with the Selected Remedy.

1.3 Assessment of Site

The response action selected in this *Record of Decision* is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. Specifically, significant risks at the MRSOU are posed to human health through ingestion of hazardous substances in potable groundwater underlying the Milltown/Bonner area. Additionally, aquatic life in the Clark Fork River is exposed to significant risks of hazardous substances during ice-induced scouring events, high flows, and the potential contaminated sediment release that would accompany a catastrophic dam failure.

1.4 Description of Selected Remedy

The MRSOU is a portion of the Milltown Reservoir/Clark Fork River Superfund Site. A related operable unit (OU) is the Water Supply OU, under which EPA provided a temporary alternative water supply to affected residents in the Milltown, Montana area. The Clark Fork River OU is located upstream of the MRSOU and covers the remainder of the Milltown Reservoir/Clark Fork River Superfund Site.

The main features of the MRSOU are the Milltown Dam and the contaminated sediments behind the dam. The Milltown Dam is located just east of Missoula, Montana (Exhibit 1-1, *Milltown Reservoir Sediments Operable Unit Site Map*), at the confluence of the Clark Fork and Blackfoot rivers. The MRSOU is adjacent to the small, unincorporated communities of Milltown and Bonner. During the past century, mine waste materials have washed downstream, creating some 6.6 million cubic yards (mcy) of contaminated sediment accumulation behind the Milltown Dam. The Milltown Reservoir/Clark Fork River Superfund Site was listed on the National Priority List (Superfund) in 1983.

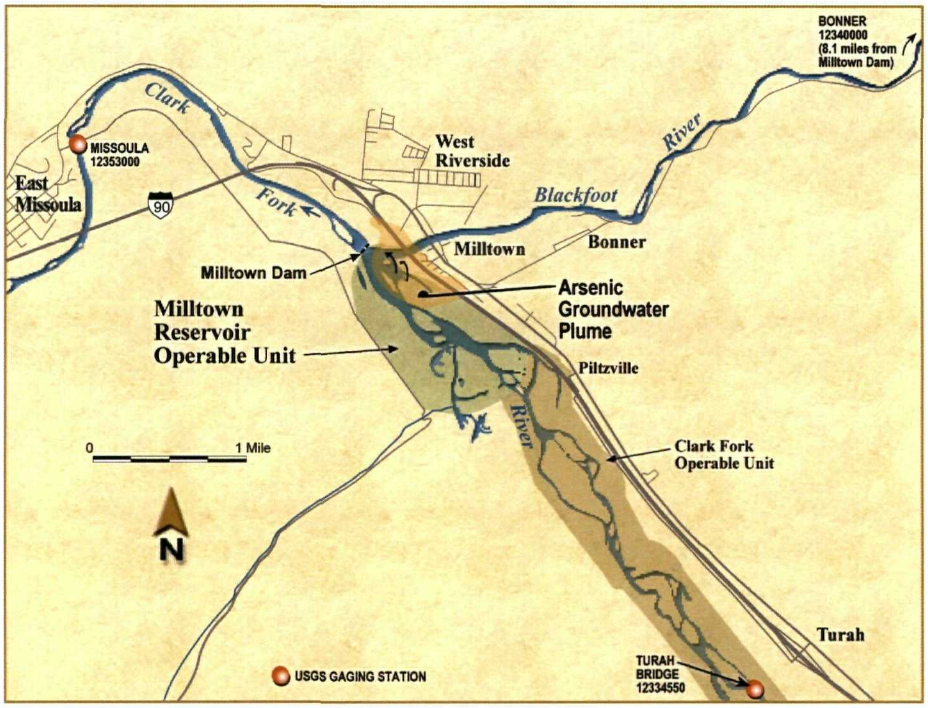


EXHIBIT 1-1
Milltown Reservoir Sediments Operable Unit Map
Showing Approximate Boundaries

The primary objectives of the Selected Remedy, as described in this *Record of Decision*, are as follows:

1. Reduce concentrations of contaminants of concern to levels at or below groundwater performance standards or eliminate the contaminated groundwater plume entirely.
2. Reduce the threat of contaminated sediment transport downstream.

These objectives will be accomplished by removing the primary source of contaminated sediment in the reservoir, removing the dam to prevent future impoundment of new sediments, and changing hydrologic conditions to accelerate natural attenuation of groundwater contamination. This approach allows natural attenuation processes to restore the aquifer over time, and ensures that remaining contaminated material is secured from uncontrolled release.

Only those sediments shown to be contributing directly to existing groundwater degradation (sediments with the highest pore water contaminant concentrations) and with the potential to contribute to future surface water degradation will be removed to meet remedial objectives. The reservoir sediments are divided into two sections, the upper and lower reservoir sediment areas, with the Duck Bridge dike and abutments forming the dividing line. These sections are further delineated into subareas based on sediment accumulation features. As shown on Exhibit 1-2, *Key Sediment Accumulation Areas* (page 1-6), the lower reservoir is comprised of Areas 1, 2, and 3. The upper reservoir encompasses Areas 4 and 5. The sediments in Area 1 (lower reservoir adjacent to Milltown) will be isolated from the Clark Fork River channel through use of a bypass channel, removed, and then transported by rail to the Opportunity Ponds. Sediment Areas 2, 3, 4, and 5 will be mostly left in place. A new river channel with flood plains for lateral stability will be designed and implemented through Areas 1 and 2, constructed, and vegetated to provide adequate stability against erosion. Highly contaminated sediments in Area 3 will be isolated from the flood plain and armored to ensure that they are not eroded into the stream. Areas 4 and 5 will be left in place unless additional work to meet Performance Standards is needed, but the streambanks will be stabilized, and the flood plain contoured, to reduce any contaminant releases from these areas to surface water, such that releases should not exceed surface water performance standards.

EPA and the Trustees have agreed to integrate remediation with State restoration activities during implementation of the remedy. Certain restoration actions—channel alignment, flood plain and streambank contouring, revegetation, and stabilization—will be done in lieu of certain remedial actions. Remedial and restoration activities of significance in this remedy include the following:

- Remedial elements:
  - Construct a bypass channel on the Clark Fork River arm of the reservoir capable of containing a 24-hour, 100-year peak flow event. Complete the channel before the dam is removed to isolate the sediments from the active river and eliminate significant scouring and downstream discharge of contaminated sediment from this portion of the reservoir. The bypass channel will be designed with the objective of fish passage during low flow through bankfull discharge (3,500 cfs).
  - Lower the pool level of the Milltown Reservoir to the lowest level possible to drain water from sediments impounded behind the reservoir. Operation of the dam shall continue by the dam operator until the dam is removed, in a manner that is consistent with the Selected Remedy.
  - Build a rail road spur to allow loading of sediments from Area 1. Locate the spur away from any residential area.
  - Remove the sediments from the bypass channel footprint and transport to Opportunity Ponds (near Anaconda, Montana) by rail.
  - Remove spillway and radial gate portion of the Milltown Dam.
  - Remove the highly contaminated sediment from Area 1, load on rail cars, and transport the sediment to Opportunity Ponds.
  - Build a new Clark Fork River channel and flood plain. Stabilize the new channel and flood plain through re-vegetation and other measures.

- Secure most sediments containing elevated levels of metals and arsenic found in the lower arm of the existing Clark Fork River channel (Area 3) or left behind the I-90 embankment from erosion, including a 100-year peak flow event. One small portion of Area 3 will be excavated.
- Monitor surface and groundwater quality during and after remedial action.
- Monitor impacts on aquatic life during implementation of remedial action.
- Dispose of debris onsite in appropriate repositories. Off-site disposal of regulated waste, such as polychlorinated biphenyls (PCBs), will be done in accordance with the laws governing that waste.
- Continue the replacement water supply program and implementation of temporary groundwater institutional controls (ICs) until the Milltown aquifer recovers using monitored natural recovery, which is expected to take about 4 to 10 years after dam and contaminated sediment removal.
- Conduct long-term operation and maintenance of the remedial action and monitor the pre-existing waste repositories, any newly created repositories, and wastes left in place.
- Wetlands mitigation will be accomplished to ensure that there is no net loss of wetlands.
- EPA will work with the Federal Energy Regulatory Commission and the Confederated Salish and Kootenai Tribes to ensure that protected historic and cultural resources are addressed in accordance with the National Historic Preservation Act.
- Replacement of any drinking water supply which exceeds groundwater performance standards as a result of remedial action implementation.
- Replacement or retrofitting of domestic wells that are found to be unusable by EPA because of the lowering of the groundwater.
- Cleanout of any downstream irrigation intakes if constricted by sediments released during remedial action.
- Best management practices (BMPs) and engineering controls will be implemented. If temporary surface water standards are exceeded, BMPs or other engineering controls, including treatment if necessary, will be re-evaluated and implemented, as determined by EPA in consultation with the State.
- Implement requirements for protection of listed species established in the USFWS Biological Opinion, as they pertain to interim dam operation or conduct of remedial action.
- Preserve the structural integrity of the five bridges located between Milltown Dam and Stimson Dam, and the Interstate 90 embankment adjacent to Milltown Reservoir, to Montana Department of Transportation requirements.

- Restoration elements coordinated with the remedy:
  - Remove the divider block/power house/north (right) abutment.
  - Match remedial channel design with the restoration flood plain and channel alignment.
  - Implement soft stabilization techniques and appropriate revegetation activities to stabilize the new channel.
  - Conduct short-term maintenance and monitoring of the revegetated streambank.
- Other related elements:
  - Although not part of the remedy, the Stimson Dam (located approximately 1 mile upstream on the Blackfoot River) will be removed prior to removal of the Milltown Dam. This is being done through a cooperative effort under the USFWS National Fish Passage Program.
  - Restoration actions will be taken by the State outside of the primary remedial action area to facilitate flood plain and channel transition into and out of the primary remedial action area and to provide additional habitat and streambank improvements.

The Selected Remedy is similar to Combined Feasibility Study Alternative 7A2 modified. Four to five construction seasons are estimated to implement the Selected Remedy.

1.5 Statutory Determinations

The Selected Remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, except for those standards that are waived and replaced with temporary construction standards, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

This remedy reduces the toxicity, mobility, and volume of the contaminated substances through removal of the most heavily contaminated material from the flood plain where it is mobile. The material will be disposed in an existing waste repository (Opportunity Ponds) and used as a vegetative capping media, where appropriate. The remedy in this OU does not satisfy the statutory preference for treatment as a principal element of the remedy because feasible treatment options are not available for the waste and site conditions at the Milltown Site, and because the waste can be effectively remediated through removal of the worst waste and in-place stabilization of the remainder.

Because this remedy will result in some contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

SOURCE: ARCO Remedial Study, 2001.

EXHIBIT 1-2
Key Sediment Accumulation Areas

1.6 Data Certification Checklist

The following information is included in the *Decision Summary* section of this *Record of Decision*. Additional information can be found in the Administrative Record file for this site.

Information Item	Page Numbers in *Record of Decision*
Contaminants of concern and their respective concentrations	2-15 to 2-17, 2-24, 2-25 to 2-29, 2-31 to 2-43
Baseline risk represented by the contaminants of concern	2-15 to 2-19, 2-55 to 2-59, 2-135
Cleanup levels established for contaminants of concern and the basis for these levels	2-61 to 2-64, 2-118 to 2-120, 2-127 to 2-129, 2-136
How source materials constituting principal threats are addressed	2-97, 2-100 to 2-116
Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater in the baseline risk assessment and the Record of Decision	2-49 to 2-53, 2-134
Potential land and groundwater use that will be available at the site as a result of the Selected Remedy	2-49 to 2-53, 2-133 to 2-134
Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected	2-133
Key factor(s) that led to selecting the remedy	2-78, 2-85 to 2-95, 2-99 to 2-100, 2-124 to 2-126

1.7 Authorizing Signatures

The U.S. Environmental Protection Agency (EPA), as the Lead Agency for the MRSOU of the Milltown Reservoir/Clark Fork River Superfund Site (MTD980717565), formally authorizes this *Record of Decision*.

Max H. Dodson — 12/15/04

Max H. Dodson
Assistant Regional Administrator
Ecosystems Protection and Remediation
EPA Region 8 — Date

The State of Montana Department of Environmental Quality (DEQ), as the Supporting Agency for the MRSOU of the Milltown Reservoir/Clark Fork River Superfund Site (MTD980717565), formally concurs with this *Record of Decision*.

Jan P. Sensibaugh — 12/14/04

Jan Sensibaugh, Director
State of Montana
Department of Environmental Quality — Date

Milltown Reservoir Sediments Operable Unit

of the Milltown Reservoir/Clark Fork River Superfund Site

Record of Decision

Part 2: Decision Summary

U.S. Environmental Protection Agency Region 8

10 West 15th Street
Suite 3200
Helena, Montana 59626

December 2004

Contents

1 Site Name, Location, and Brief Description

Site Name:	Milltown Reservoir Sediments Operable Unit of the Milltown Reservoir/Clark Fork River Superfund Site
CERCLIS Identification Number:	MTD980717565
Site Location:	Missoula County, Montana
Lead Agency:	U.S. Environmental Protection Agency
Support Agency:	State of Montana Department of Environmental Quality
Source of Cleanup Monies:	Potentially Responsible Party Enforcement
Site Type	Reservoir sediments impacted by historic mining wastes

The U.S. Environmental Protection Agency (EPA), in consultation with the Montana Department of Environmental Quality (DEQ), is authorizing the Selected Remedy described in this *Record of Decision* to address a reservoir with impounded metals and arsenic-enriched sediments mixed with mine wastes originating from more than 100 years of upstream mining activity. The subject site is the Milltown Reservoir Sediments Operable Unit (MRSOU). The Milltown Dam, and its associated powerhouse containing hydroelectric generating facilities, was built in 1907. The reservoir, located at the confluence of the Clark Fork and Blackfoot rivers, comprises approximately 540 acres with a topographical boundary defined as the area behind the dam inundated by the maximum pool elevation of 3,265.5 feet (NAV 1988 datum) as originally calculated by Montana Power Company, now NorthWestern Corporation. The approximate location of the Milltown Site is shown in Exhibit 2-1, *Milltown Reservoir Sediments Operable Unit Map*. The site also includes the plume of groundwater contamination coming from the sediments and the temporary water supply.

EPA is the lead agency for the MRSOU, and DEQ is the supporting agency. Numerous other entities, including the Trustees (State of Montana [State], the Confederated Salish and Kootenai Tribes [CSKT] and the U.S. Department of the Interior [DOI]) other government agencies, local governments, academic research groups, landowners and public interest groups have participated in the Superfund process up to the present. The responsible parties (RPs) are the Atlantic Richfield Company, a subsidiary of BP p.l.c., and NorthWestern Corporation, the facility owner. The site cleanup is expected to be funded by the RPs.

Metals and arsenic enriched sediment transported and deposited in the reservoir by active and historic fluvial processes of the Clark Fork River represent the source of groundwater and surface water contamination associated with this OU. Geochemical conditions within the reservoir have contributed to the formation of a plume of arsenic-contaminated

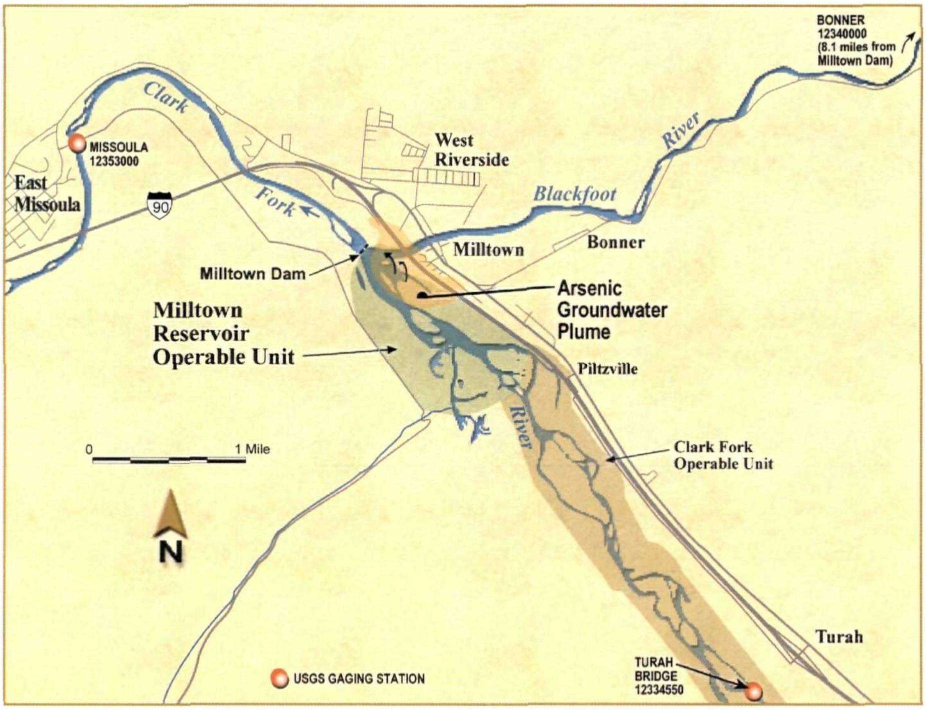


EXHIBIT 2-1
Milltown Reservoir Sediments Operable Unit Map
Showing Approximate Boundaries

groundwater that has impacted the drinking water supply of the community of Milltown, located adjacent to the reservoir. Concentrations of copper and other metals in the reservoir sediments represent a potential and actual threat to resident aquatic life within the reservoir and immediately downstream, particularly when sediments within the reservoir are scoured as a result of the movement of ice or change in flow conditions induced by high flows or reservoir drawdown. The dam impounding the sediments does not meet current fish passage and safety (earthquake and flood) requirements. The catastrophic release of contaminated sediments would cause significant environmental harm. Endangered Species Act (ESA) and Federal Power Act requirements for dam operation would likely require extensive dam improvements.

2 Site History and Enforcement Activities

During the 1860s, placer mining began in the Butte-Silver Bow Creek area (headwaters of the Clark Fork River Basin). This was followed shortly by mining shallow underground deposits for gold, silver, copper, and other metals. The mine wastes and mill tailings, which contained various amounts of unrecovered metals and arsenic, were generally released to the local creeks, which conveyed the mining and milling wastes downstream in minor amounts. Mining and milling of deeper copper and silver ores in Butte and Anaconda began during the late 1880s. With the introduction of electricity in the early 1900s, milling practices improved and new mining practices significantly increased ore production and metals recovery rates, and substantially increased annual mine and mill tailings volume. In the Butte area, most mine and milling wastes were directly disposed into Silver Bow Creek well into the 20th century. Most of these Butte facilities originated with or came to be controlled by the Anaconda Company. These wastes subsequently mixed with other stream sediments and were carried down Silver Bow Creek and into the upper Clark Fork River by annual high flows and periodic floods. Ore processing wastes from the Anaconda Company's operations 30 miles to the west in Anaconda, Montana, also entered Warm Springs Creek and related tributaries in large quantities and were transported to the upper Clark Fork River as well.

Milltown Dam Construction, 1906

The fluvial transport rate, mixing with other sediments, and subsequent deposition of the contaminated mixed waste and sediments into the downstream floodway of the upper Clark Fork River varied depending on weather and hydrologic conditions. During snowmelt runoff and major thunderstorms, more wastes were transported and subsequently deposited downstream as a result of higher stream flows. In 1908, the largest flood event on record for the upper Clark Fork drainage occurred as a result of rain on snow and frozen ground. It is estimated that this major flood event remobilized large quantities of metals and arsenic-contaminated sediments and mine-mill wastes from the upper Clark Fork River channel and flood plain and transported large quantities to the recently constructed Milltown Reservoir. Much of the arsenic and metals contaminated sediment was deposited in the reservoir backwater area created by the dam.

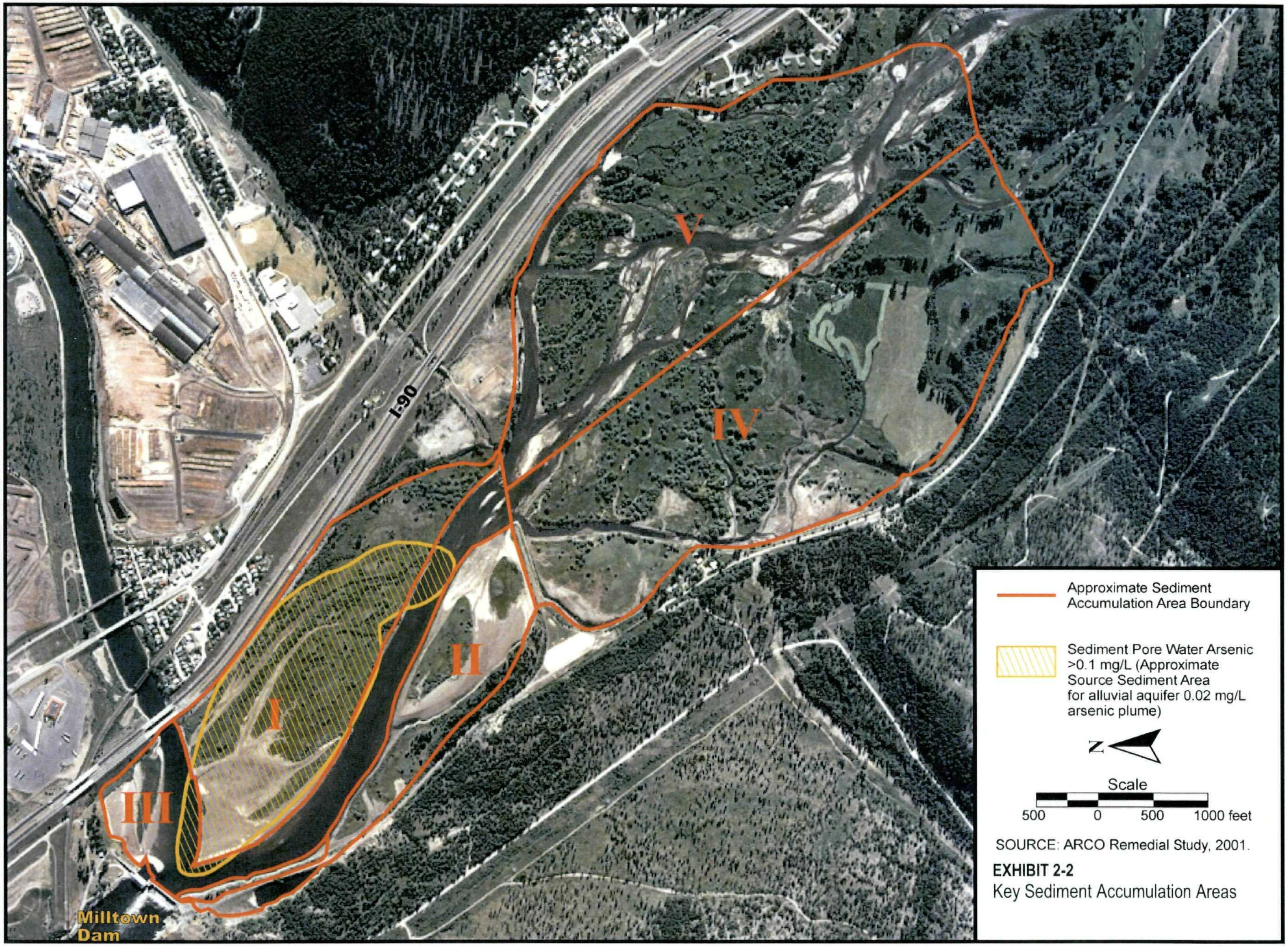
Between 1918 and 1959, a series of settling ponds (known as Warm Springs Ponds) were built near the end of Silver Bow Creek, just upstream of Warm Springs Creek, to better control the contaminated sediments entering the upper Clark Fork River. As a result, the amount of contaminated sediments from the Butte and Anaconda area reaching the Milltown Dam and reservoir after 1918 was significantly less. However, substantial quantities of waste continued to be washed downstream to the reservoir from previously deposited areas downstream of Warm Springs Ponds, the Anaconda Area, and output from the ponds.

Historically, backwater conditions created by impoundment of water in the reservoir caused sediments carried by the Clark Fork and Blackfoot Rivers to settle. Diminishing flow velocities as the river water enters the backwater areas results in the deposition of more coarse grained, heavier sediments first, at the head of the reservoir. The finer portion of the sediment is transported and settle closer to the dam (the mouth of the reservoir). Under annual peak runoff and storm events where flow velocities through the reservoir increase substantially, hydraulic conditions at the confluence of these rivers becomes more dynamic and sediments may actually be scoured from the reservoir. These different conditions create a "dynamic equilibrium" relative to sediment storage within the reservoir and have contributed to the highly variable metal and arsenic concentrations observed vertically and horizontally throughout the sediments. Higher metals concentrations are typically associated with the finer fraction of sediment (clay and silt portion). Older, deeper sediments also tend to have higher levels of metals and arsenic than the more recently deposited surficial sediments.

Today the Milltown Dam is operated as a "run-of-river" dam, meaning the outflow from the dam equals the inflow into the reservoir from the Clark Fork and Blackfoot rivers. Aerial photographs from 1940, 1964, and 1991 suggest that the Clark Fork River channels within the reservoir, and the adjacent sediment deposits, have been relatively stable with little net deposition or erosion in recent times. The reservoir is estimated to contain approximately 6.6 million cubic yards of sediments distributed upstream over various backwater areas. The area creating the contaminated groundwater plume is Area 1 (Area 1; see Exhibit 2-2, *Key Sediment Accumulation Areas*), which consists of the most heavily contaminated sediments. It is located between the Blackfoot and Clark Fork channels adjacent to the community of Milltown.

Milltown Dam Construction, 1906

Since 1982, numerous investigations and clean-up studies have been conducted on the MRSOU. The Atlantic Richfield Company prepared major portions of the final MRSOU *Remedial Investigation* and *Feasibility Studies* (RI/FS), and completed a Dry Removal Sediment Scour Evaluation that modeled sediment scour from the reservoir under several removal variations associated with the remedy. EPA, in consultation with DEQ, provided oversight of the RI/FS activities conducted by the Atlantic Richfield Company. EPA produced the *Human Health Risk Assessment* (July 1993), the original *Ecological Risk Assessment* (July 1993), and the *Ecological Risk Assessment Addendum* (April 2000) (EPA 1993a, 1993b, and 2000). EPA also produced the MRSOU *Original Proposed Plan* (April 2003), and *Revised Proposed Plan* (May 2004).



SOURCE: ARCO Remedial Study, 2001.

EXHIBIT 2-2
Key Sediment Accumulation Areas

Key documents relevant to the MRSOU include the following:

- *Final Report: Arsenic Source and Water Supply Remedial Action Study, Milltown, Montana* – 1984. Woessner and Moore, prepared for the Solid Waste Bureau, Montana Department of Health and Environmental Sciences, Helena, Montana.
- *Baseline Ecological Risk Assessment – 1993a. Milltown Reservoir Operable Unit, Milltown Reservoir Superfund Site.* Prepared by Environmental Toxicology International for EPA Region 8. Seattle, Washington. *Ecological Risk Assessment Addendum – 2000.* Prepared by CH2M HILL for EPA.
- *Baseline Human Health Risk Assessment – 1993b. Milltown Reservoir Operable Unit, Milltown Reservoir Superfund Site.* Prepared by Environmental Toxicology International for EPA Region 8. Seattle, Washington.
- *Continuing Releases Risk Assessment Milltown Reservoir Operable Unit, Milltown Reservoir Superfund Site – 1993c.* Prepared by Environmental Toxicology International for EPA Region 8. Seattle, Washington.
- *Milltown Reservoir Sediments Operable Unit – 1995. Final Remedial Investigation Report.* Prepared by Titan Environmental Corporation for the Atlantic Richfield Company. Bozeman, Montana.
- *Milltown Reservoir Sediments NPL Site: Milltown Reservoir Operable Unit – Feasibility Study Report* – 1996. Prepared by Pioneer Technical Services, Inc. for the Atlantic Richfield Company. Butte, Montana.
- *Milltown Reservoir Sediments Site Draft Focused Feasibility Study* – 2000. Prepared by EMC2, Bozeman, Montana, for the Atlantic Richfield Company.
- *Milltown Reservoir Sediments Site Combined Feasibility Study – 2002.* Prepared by EMC2, Bozeman, Montana.
- *Draft Conceptual Restoration Plan for the Clark Fork River and Blackfoot River near Milltown Dam*, as amended, prepared by Water Consulting Inc. and Dave Rosgen, February 2003, amended June 2004 (DCRP).
- *Milltown Reservoir Sediments Site Proposed Plan – 2003.* Prepared by EPA.
- *Milltown Reservoir Sediments Revised Proposed Plan – 2004.* Prepared by EPA
- *Milltown Reservoir Dry Removal Scour Evaluation - Final Technical Memorandum* prepared by Envirocon and EMC2 for the Atlantic Richfield Company - May, 2004
- *Milltown Reservoir Dry Removal Scour Evaluation - Addendum 1* - October 2004. Prepared by Envirocon and EMC2 for the Atlantic Richfield Company.

2.1 Chronology of Key Historical Activities and Enforcement Activities

Following is the chronology of key historical activities and enforcement activities, as shown on Exhibit 2-3, *Site History Timeline*:

- 1864 to 1970s: Essentially uncontrolled releases of mining and milling wastes continued in the Clark Fork River basin. Periodic flooding events cause sediments to be deposited in Milltown Reservoir after 1907.
  - 1907: Milltown Dam constructed to provide hydroelectric power.
  - 1908: Largest flood on record for Clark Fork River, caused by a rain-on-snow event. Mining and milling wastes washed downstream with sediments into the Milltown Reservoir.
  - 1929: Ownership of Milltown Dam transferred to Montana Power Company.
  - 1977: Atlantic Richfield Company merges with the Anaconda Company.
- 1980s: Mining in Butte and Anaconda ceases and environmental investigations begin.
  - 1981: Arsenic was found by local public health authorities in Milltown drinking water wells. Levels exceeded Federal drinking water standard (then 0.05 mg/l, lowered in 2001 to 0.01 mg/l arsenic).
  - 1982: Three sites are proposed for addition to the National Priority List (NPL): the Silver Bow Creek/Butte Area Site, the Anaconda Smelter Site, and the Milltown Reservoir Site.
  - 1983: Milltown Reservoir Site was added to the Superfund list as the first Montana NPL Site; Atlantic Richfield Company suspends all mining activity in Butte after shutting down the Anaconda smelter.
  - 1984: Response Action installed a new drinking water system for Milltown. No institutional controls (ICs) put in place.
  - 1986: Rehabilitation and upgrades to spillway and dam. The work by NorthWestern Corporation predecessor, the Montana Power Company, extended through 1990 and resulted in 14,500 cubic yards of waste (reservoir sediments) and debris being transported and encapsulated in the Upland Disposal Site. An earlier disposal site was also constructed onsite by Montana Power Company.
  - 1989: United States sues Atlantic Richfield Company for reimbursement of costs at the three sites; litigation is ongoing, although stayed and partially settled.
- 1990s and 2000s: Remediation investigations and studies
  - 1991: RI/FS order on consent issued to Atlantic Richfield Company.

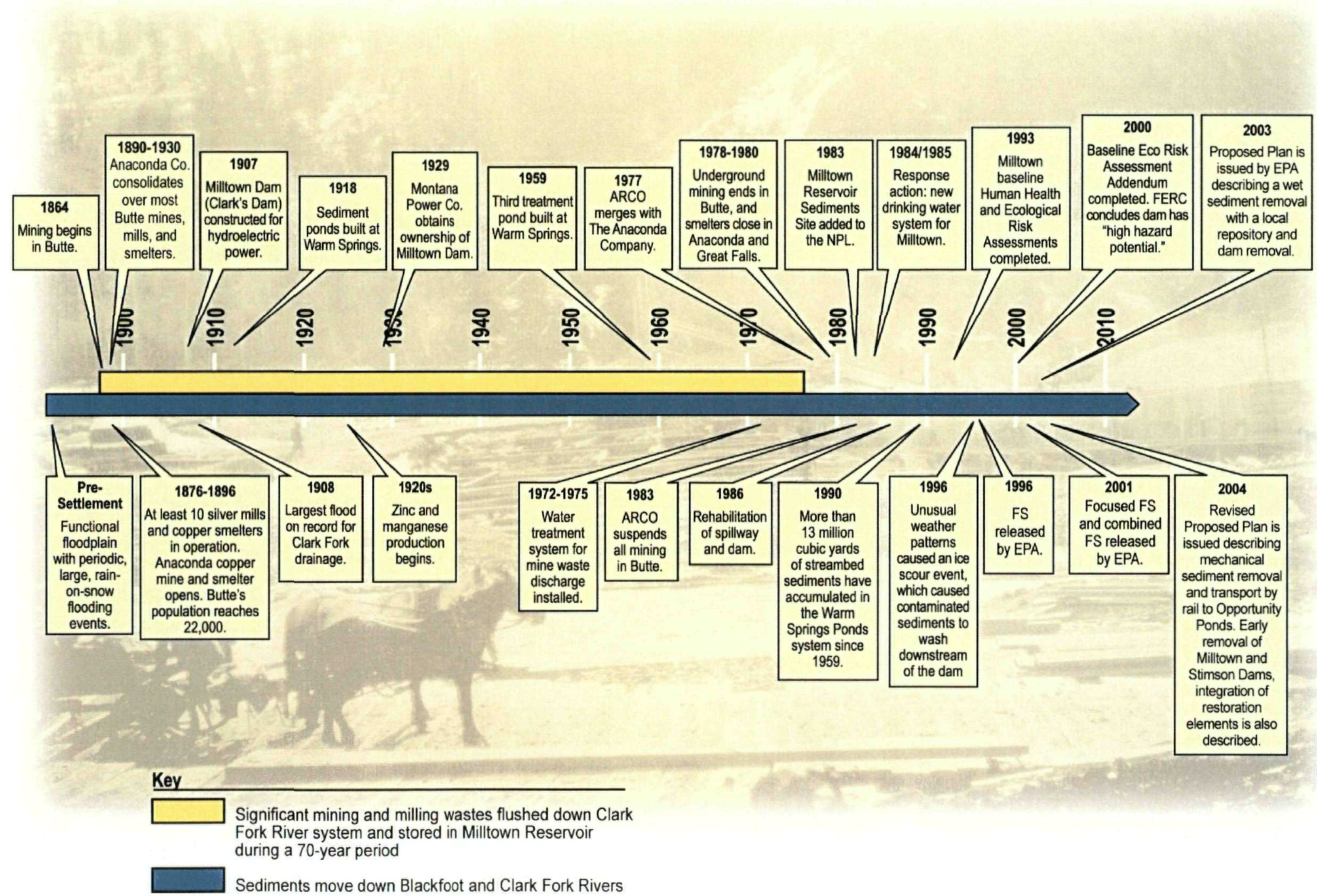


EXHIBIT 2-3
Site History Timeline

- 1993: Milltown Remedial Investigation, *Baseline Human Health, Ecological*, and *Continued Releases Risk Assessments* completed. Groundwater contamination recognized as the principal problem to be remedied.
- 1995 Final *Remedial Investigation* Report completed by Titan Environmental Corporation on behalf of the Atlantic Richfield Company.
- 1996: Draft *Feasibility Study* (regarding groundwater) released by Atlantic Richfield Company. That same year, unforeseen climatic conditions cause an ice scour event, which sends high levels of metals contamination down river. EPA expanded the scope of the *Feasibility Study* and conducted further risk assessments.
- 1998/1999: Bull trout listed under the ESA.
- 2000: Milltown Reservoir Baseline *Ecological Risk Assessment Addendum* released for public review. The Federal Energy Regulatory Commission (FERC) re-classifies dam as "High Hazard Potential," and initiates dam safety review.
- 2001: *Focused Feasibility Study* released by Atlantic Richfield Company and approved by EPA that examines alternatives for addressing surface water quality. The *Combined Feasibility Study* is prepared later in the year and submitted to and approved by EPA. This report combines key alternatives from the original 1996 *Feasibility Study* with those of the *Focused Feasibility Study*. NorthWestern Corporation purchases Montana Power assets including Milltown Dam and Reservoir.
- 2002: *Combined Feasibility Study* released to the public. Remedy recommendation submitted to National Remedy Review Board and the National Sediment Review Panel.
- 2003, February: Draft Conceptual Restoration Plan (DCRP) for the Clark Fork River and Blackfoot River near Milltown Dam, prepared by Water Consulting Inc. and Dave Rosgen, is released by the State of Montana, in consultation with other Trustees.
- 2003, April: *Proposed Plan* for the MRSOU is released to the public for comment. General elements included the following: isolate and remove the most heavily contaminated sediments (2.6 million cy), dredge 85 percent of the sediments and transport to a new local waste disposal repository by slurry pipeline, remove the Milltown Dam and radial gate, design/build a new flood plain and channel for the Clark Fork River, stabilize and re-vegetate the new flood plain and channel, continue the water replacement program, monitor the arsenic groundwater plume, and perform long-term maintenance on the sediment repositories.
- 2004, Spring: Milltown Reservoir *Dry Removal Scour Evaluation – Final Technical* Memorandum. Provides predictions on the amount of sediment that will be scoured and transported downstream for various cleanup options.
- 2004, Spring: *Revised Proposed Plan* for the MRSOU is re-released to the public for comment. The *Revised Plan* reflects responses to the initial public comments by

proposing a total bypass channel, mechanical removal of sediments, disposal of sediments at Opportunity Ponds, and early removal of the Milltown and Stimson Dams.

- 2004, June: DCRP is amended by the State of Montana and made final after response to comments.
- 2004, August and October, The Milltown biological assessments for bull trout, bald eagle, and other protected species are released by EPA to U.S. Fish and Wildlife Service (USFWS) as required by ESA.
- 2004, December: EPA releases this *Record of Decision*. USFWS releases its Biological Opinion for the Milltown Project (USFWS 2004).

3 EPA, State, and Community Participation in the RI/FS Process

There is a rich history of stakeholder involvement at the MRSOU. Area residents first became involved in 1981 when the Missoula City-County Health Department found levels of arsenic above the Federal drinking water standard (50 ppb at the time) in drinking water wells. Now, more than 20 years later, local interest has never been higher.

Early community activities were led by the Missoula City-County Health Department and the Montana Department of Health and Environmental Science (MDHES, now DEQ). In 1989, the Milltown EPA Superfund Site (MESS) group was formed by concerned citizens who felt the State and EPA were unresponsive to community concerns about contaminated sediments being excavated by the Montana Power Company. MESS's membership was diverse and included residents of Milltown, Bonner, Bonner Junction, and Missoula, as well as representatives from local civic and environmental groups. Several MESS members formed the Milltown Technical Advisory Committee (MTAC). In 1991, MTAC applied for and received a Technical Assistance Grant (TAG), the first awarded in Montana. MTAC used TAG funds to hire technical advisors to review and comment on EPA's Site-related documents and to share this information with other community members. Other groups initially active at the MRSOU were the Clark Fork—Pend Oreille Coalition, the League of Women Voters, and the Montana Public Interest Research Group.

Over the years, EPA has worked closely with the local community members and organized groups as well as the TAG group. For example, through a broad-based group called the Milltown Endangerment Assessment Committee (MEAC), members of the public were actively involved in developing the *Human Health* and *Ecological Risk Assessments* (EPA 1993a, 1993b, and 1993c). Similarly, the public was informed and involved during the development of the *Continued Releases Risk Assessment* (1994). The TAG group (which changed its name from MTAC to the Clark Fork River Technical Assistance Committee [CFRTAC] in 1997) and other stakeholders (Clark Fork Coalition, Trout Unlimited, Bonner Development Group, Bonner-Milltown Community Forum, members of the public, the State of Montana, CSKT, City and County of Missoula, Mountain Water, U.S. Army Corps of Engineers [USACE], and the USFWS) regularly attended and participated in meetings of the Feasibility Study Development Group. These stakeholders reviewed and provided input into the *Ecological Risk Assessment Addendum* (EPA 2000) and the *Focused Feasibility Study* (Atlantic Richfield Company 2000b). Stakeholders were also involved in the development of the *Combined Feasibility Study* (Atlantic Richfield Company 2001c). In 2001 and 2002, EPA held public meetings and open houses, posted flyers, issued fact sheets and postcards, held numerous meetings (with property owners, community groups and local elected officials), made presentations and TV appearances, issued press releases and public service announcements, participated in media interviews, and posted comprehensive information on EPA's Milltown web page (http://www.epa.gov/region08/superfund/sites/mt/milltowncfr/home.html) about the various cleanup alternatives for the Site. In April 2003, EPA released the *Original Proposed Plan* for the site. During the public comment period

(April 15 through June 20, 2003), EPA received 4,029 comments. Of these, approximately 88 percent (3,578 out of 4,029) supported the *Original Proposed Plan* as written or with minor modifications. In response to significant community comments and a new sediment removal proposal from the Atlantic Richfield Company, EPA revised the *Original Proposed Plan*. Among the many important changes in the *Revised Proposed Plan* was a new disposal location for excavated sediments (Opportunity Ponds) and coordination with restoration Trustees, who would provide a more natural channel design for the Clark Fork River post-remediation. These changes were made in direct response to public comments on the *Original Proposed Plan*.

The *Revised Proposed Plan* was released for public comment (May 19 through June 21, 2004). EPA received 805 comments on the *Revised Proposed Plan*, with approximately 98 percent (785 out of 805) supporting the proposal as written or with minor changes. In addition to the two formal comment periods in 2003 and 2004, EPA conducted various outreach activities associated with the release of the two proposed cleanup plans. Specifically, EPA held public meetings and open houses, posted flyers, issued fact sheets and postcards, held numerous meetings, made presentations to various groups, issued press releases and public service announcements, participated in media interviews, and updated information about the cleanup proposals on the Milltown Reservoir web site.

At the public meetings, EPA and DEQ representatives presented information, answered questions, and accepted public comments for the record. EPA's response to all significant comments received during the public comment period (oral, written, and e-mail) on the *Original* and *Revised Proposed Plans* are included in the *Responsiveness Summary*, which is Part 3 of this *Record of Decision*.

Since 1991, EPA has awarded a total of $500,000 in TAG funds to the CFRTAC. CFRTAC continues to be heavily involved in Site cleanup discussions and decisions and effectively communicates technical information to its membership and the general public.

In July 2002, EPA awarded $40,000 in Superfund Redevelopment assistance for use at the MRSOU. With this funding as a catalyst, a community-based Redevelopment Steering Committee formed, and developed an application process for stakeholders interested in serving on the Redevelopment Working Group. In July 2003, the Missoula County Commissioners appointed some 20 people, representing a broad range of interests (business, parks and recreation, environmental issues, fisheries, public health, historic preservation, etc.) to serve on the Redevelopment Working Group. Technical support to this group is provided by staff from Missoula County, EPA, DEQ, Montana Fish, Wildlife and Parks (FWP), Montana Natural Resource Damages Program (NRDP), DOI/National Park Service's Rivers and Trails Program, and the CSKT. The Redevelopment Working Group has been meeting regularly for the past year, examining opportunities for redevelopment. The group hopes to build upon past community development goals and area residents' visions for the future. The group is drafting plans to capitalize on redevelopment opportunities brought about by MRSOU remediation and restoration. The Redevelopment Working Group distributed its first newsletter in fall 2004, and plans to hold public meetings on possible redevelopment and land use ideas in early 2005.

4 Scope and Role of OU or Response Action

The Clark Fork Basin Superfund complex is made up of four contiguous sites broken into operable units (OUs) for easier management, as shown on Exhibit 2-4, *Regional Location Map*:

- Silver Bow Creek/Butte Area Site—1982
  - Butte Priority Soils OU
  - Lower Area One/Emergency Response Action OU
  - Mine Flooding/Berkeley Pit OU
  - Westside Soils OU
  - Butte Active Mine Area OU
  - Rocker OU
  - Streamside Tailings OU
  - Warm Springs Ponds OUs (Active and Inactive)
  - Numerous Removal OUs
- Montana Pole Site—1987
- Anaconda Smelter Site—1982
  - Smelter Demolition Removal OU
  - Mill Creek Temporary Relocation Removal OU
  - Mill Creek Final Relocation Remedial OU
  - Anaconda Yards Removal OUs
  - Arbiter and Beryllium Wastes Removal OUs
  - Old Works Removal OU
  - Old Works/East Anaconda Development OU
  - Flue Dust OU
  - Anaconda Community Soils OU
  - Anaconda Warm Springs Creek Removal OU
  - Anaconda Regional Water, Waste, and Soils OU
- Milltown Reservoir/Clark Fork River Site—1982
  - Milltown Water Supply OU
  - MRSOU
  - Clark Fork River OU

EXHIBIT 2-4
Regional Location Map

The combined sites include more than 140 miles from the headwaters of Silver Bow Creek north of Butte to the Milltown Dam near Missoula.

The MRSOU is one of three OUs within the Milltown Reservoir/Clark Fork River Superfund Site. The other OUs are the Milltown Water Supply and Clark Fork River. Although contiguous, the two main OUs within the site have been divided such that actions in one site or OU are not dependent on activities in other areas. The MRSOU Selected Remedy is meant to comprehensively address the human health and environmental risks and other response action issues identified for this area. It does not address natural resource damage claims related to the establishment of baseline conditions at the MRSOU—these were previously, and will be, addressed by the State, Federal, and Tribal natural resource damage Trustees. This *Record of Decision* describes the interaction between the remedy and restoration decisions, and the coordinated implementation of the two plans.

Silver Bow Creek Showing Slickens Deposits

Washoe Smelter in Anaconda during Operation

Butte – Berkeley Pit

Tailings deposits along the Upper Clark Fork River

5 Site Characteristics

5.1 Conceptual Model

The primary source of contaminants of concern in the Milltown Reservoir is the accumulated sediments from the upper Clark Fork River and headwater tributaries. The sediments consist of a mixture of clay, silt, sands, organic material, and residual historic mine tailings and wastes transported to, and deposited in, the reservoir over approximately 100 years. Secondary sources include contaminated surface water that exposed aquatic flora and fauna to arsenic and metals. Other secondary sources include surface water and suspended sediment transported from the Clark Fork River OU upstream.

The primary pathways by which contaminants move within and between media include sediments, groundwater, and surface water transmissions. Fate and transport of contaminants by these media are listed below and shown in Exhibit 2-5, *Conceptual Model: Cross-Section of Hydrogeological System and Geochemical Process in Milltown Reservoir.*

- **Reservoir Sediments**
  - Geochemical conditions induced by fluctuation of the reservoir pool level releases arsenic into the sediment pore water; reservoir head pressure and local groundwater flow patterns become the transporting mechanism.
  - Ice scour, high flows, and operational drawdowns liberate, and allow re-suspension by river water of contaminated sediment from the reservoir facilitating the transport of total and dissolved arsenic and metals downstream; aquatic flora and fauna exposed.
  - Contaminants are ingested by aquatic invertebrates or accumulated by plants and enter the food chain.
  - Sediment material coated with metal oxides, sulfides, and hydroxides—potential dissolution into the river water.
  - Dam failure would cause release of large quantities of contaminated sediments downstream.
- **Groundwater**
  - Sediment pore water and groundwater interaction.
  - Groundwater flow into the local aquifers.
  - Groundwater and surface water interaction.
- **Surface Water**
  - Surface water and sediment interaction.
  - High seasonal flows in the Clark Fork and Blackfoot Rivers erode reservoir sediment and re-suspend it for transport downstream.

  - Reservoir drawdown also creates conditions that promote erosion of the in-place sediments and their subsequent transport downstream.

- **Biological resources**
  - Aquatic organisms and plants exposed through consumption of or exposure to contaminated sediments or ingestion or absorption of water. Periods of high flow induced by seasonal snow melt or storms represent mechanisms for downstream transport of contaminants.
  - Dermal contact with sediment by persons recreating at the reservoir or using sediment as an amendment for gardens, is a potential exposure mechanism.

- **Airborne Transmissions**
  - Dust entrainment by wind during drought conditions or extended reservoir drawdown; potential inhalation and ingestion of dust by residents.

The factors influencing the conceptual site model are discussed in more detail throughout this section. Primary exposure pathways for potential human health risk and ecological risk are presented in Exhibit 2-6, *Conceptual Model of Exposure Pathways.*

5.2 Site Overview

5.2.1 Site Size, Geography, and Topography

The MRSOU is located at the confluence of the Clark Fork and Blackfoot Rivers in Missoula County, Montana, as shown on Exhibit 2-7, *Photomap of Milltown Reservoir Site: Reservoir at Low Pool*. The reservoir was formed by the construction of Milltown Dam in 1907, and is located approximately 7 miles upstream of Missoula, Montana. The Milltown Dam is owned and operated as a hydroelectric generating facility by NorthWestern Corporation and is licensed and regulated by FERC. The current license is valid through December 31, 2006. The community of Milltown is located 1/2 mile east of the dam and powerhouse. The smaller community of Bonner borders Milltown to the northeast. The Stimson timber mill complex is just east of Milltown, adjacent to the Blackfoot River. The general residential area has a population of approximately 2,000 (Atlantic Richfield Company 1995). The site is bounded to the east and north by a major railroad, interstate highway with interchange, and local access roads.

Tailwaters of Milltown Dam

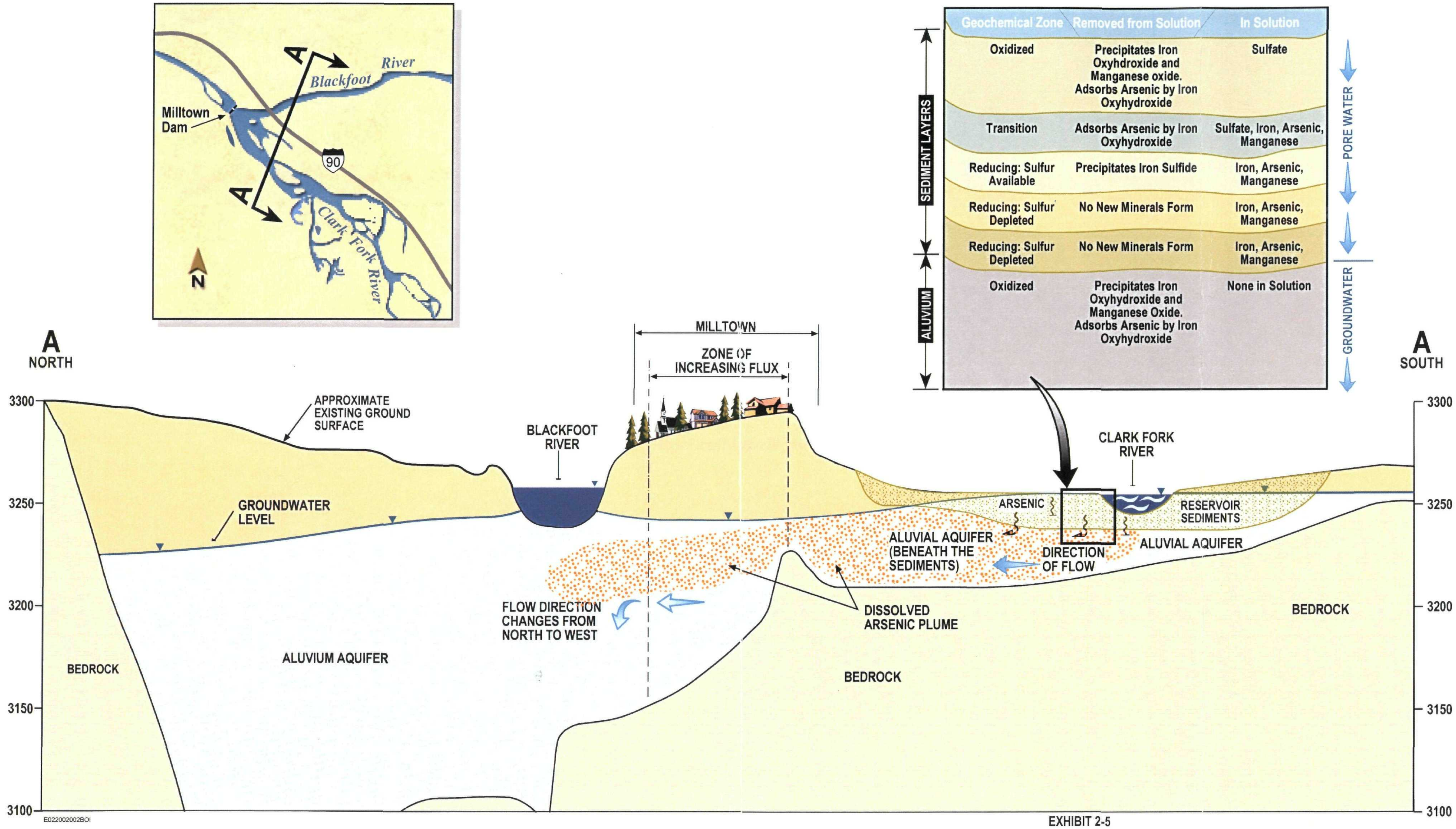


EXHIBIT 2-5
Conceptual Model: Cross-Section of Hydrogeological System and Geochemical Processes in Milltown Reservoir

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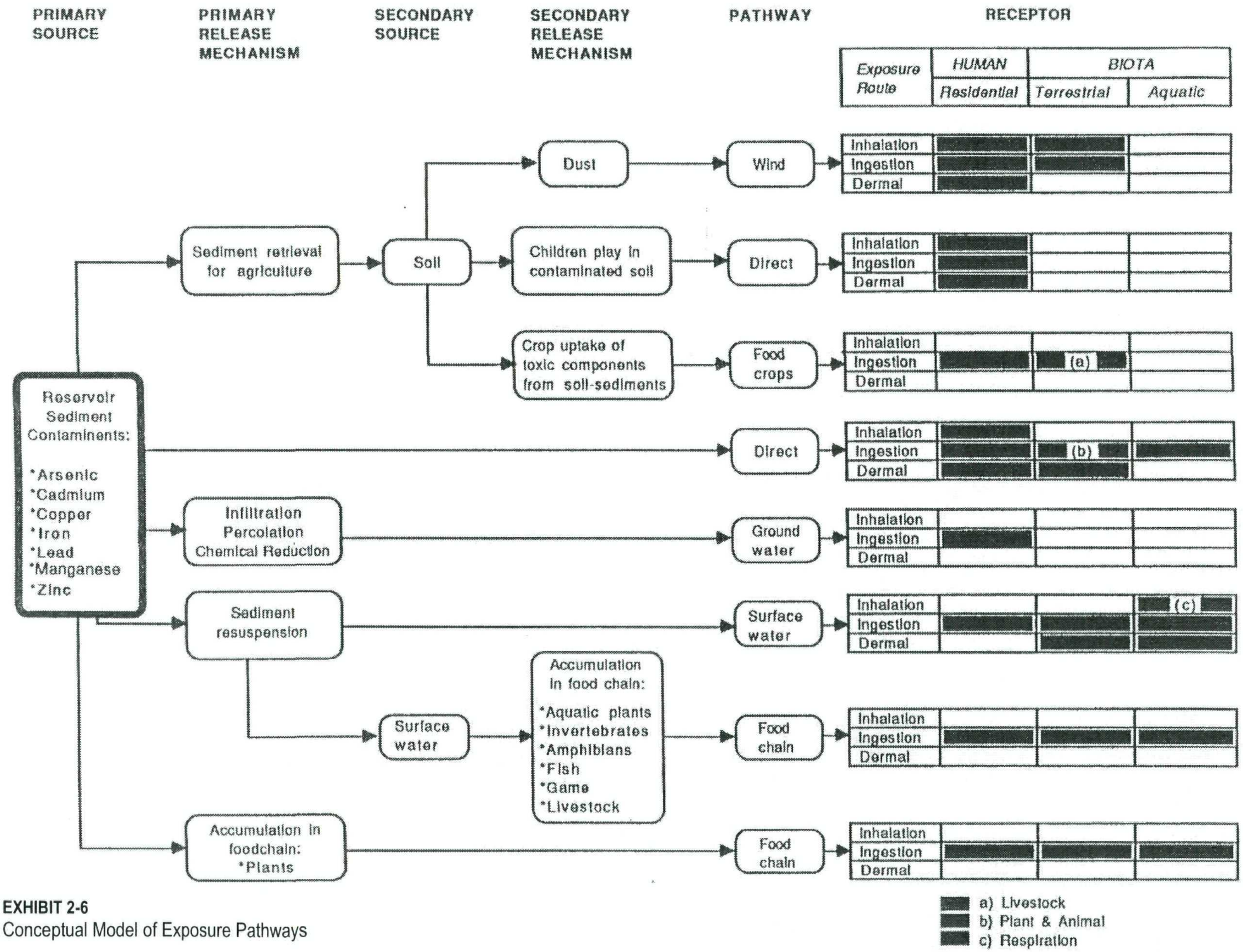

EXHIBIT 2-6
Conceptual Model of Exposure Pathways

The reservoir boundary is defined as the area inundated by the maximum pool elevation of 3263.5 feet above mean sea level (amsl), which is an area of about 540 acres. For *Feasibility Study* purposes, the reservoir was divided into two subsections: the upper reservoir and lower reservoir, with the dividing line at Duck Bridge (see Exhibit 2-7). The boundary extends approximately 2 miles up the Clark Fork Valley. The actual Superfund OU boundaries are larger and include both the reservoir sediment area, and the groundwater plume area, as shown on Exhibit 2-1, *Milltown Reservoir Sediments Operable Unit Map*. The OU also includes the temporary water supply facilities.

5.2.2 Surface and Subsurface Features

Milltown is located in an alluvial valley in the northern Rocky Mountain region of Montana. Valley width ranges from 0.75 to 1.5 miles upstream from the dam. Local relief varies from a low of approximately 3250 feet above mean sea level in the valley to 6813 feet at Bonner Mountain.

This wide valley is underlain by Quaternary alluvial deposits and Precambrian meta-sediments. Valley alluvium consists of both laterally and vertically interbedded sand, gravel, and boulders with some clay lenses. This complex configuration of sediment deposits results from an apparent variation in the location of the Clark Fork channel over geologic time. This material is exposed on both sides of the Clark Fork River and underlies recent reservoir sediments near the Milltown Dam. Well drillers' geologic logs indicate that the alluvial deposits generally thicken north of the reservoir and reach a depth of 155 feet within the southern boundaries of the Stimson Mill.

Precambrian meta-sediments of the Belt Series underlie the valley alluvium. Argillite, quartzite, and limestone outcrop on Mount Sentinel, Bonner Mountain, and Sheep Mountain near Milltown. Several diabase sills and dikes intrude the metamorphosed sediments along the argillite-quartzite contact near the dam and on the slopes of Sheep Mountain.

5.3 Surface Water Hydrology

The Milltown Reservoir is considered a "run of the river" reservoir, meaning the flow rate of water leaving the reservoir to the lower Clark Fork River is equal to the flow rates of the Clark Fork and Blackfoot rivers entering the reservoir. Thus, actual water storage capacity of the reservoir is limited because of the accumulation of sediments behind the dam. The contribution of annual stream flow by the Blackfoot and Clark Fork rivers into the Milltown Reservoir was estimated from historic USGS stream flow records. Discharge records for the Blackfoot River near Bonner and the Clark Fork River above Missoula indicate the Blackfoot River contributes approximately 54 percent of the annual surface water discharge into the Milltown Reservoir, in spite of having a smaller drainage area.

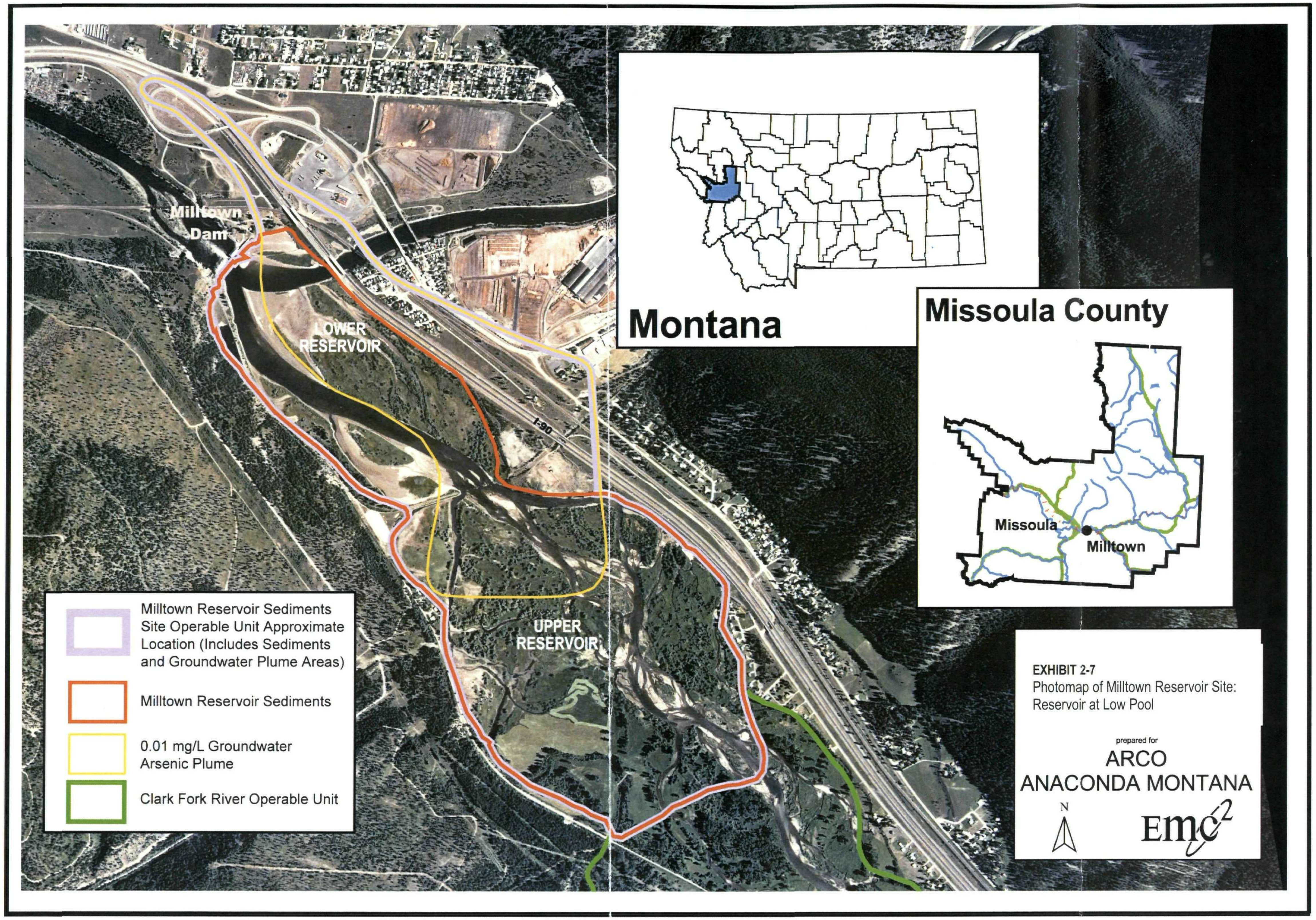

EXHIBIT 2-7
Photomap of Milltown Reservoir Site: Reservoir at Low Pool

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A 53-year average discharge for the Blackfoot River at the Bonner U.S. Geological Survey (USGS) Gauging Station is 1,619 cfs. Over the period of record, the maximum discharge in June 1964 was 19,200 cfs; the minimum in January 1950 was 200 cfs. The average annual spring flood at Bonner is 9,613 cfs; however, the 1997 spring flood event peaked at 16,200 cfs, as shown on Exhibit 2-8, *Surface Water Quality During Spring 1997 Flood Event for Clark Fork and Blackfoot Rivers.* (Longer-term surface water quality is discussed in greater detail in Section 5.5.2, *Surface Water Transport of Contaminants.*)

The average discharge for the Clark Fork River flow, measured 2.8 miles downstream of Milltown Dam at the USGS gaging station at East Missoula, is 2,973 cfs. Over the period of record from 1929 through 1997, the maximum discharge was 32,300 cfs measured in June 1975. Flows during the June 1997 runoff peaked at 26,300 cfs. Minimum flow was 340 cfs (Sept. 27, 1937). The 1908 flood (with an estimated peak of 48,000 cfs) lasted from May 25 to June 5, and resulted in the fluvial transport of large volumes of metals-enriched mine and mill wastes, soils, and sediments down the Clark Fork River. Much of this load was deposited behind the new Milltown Dam, which was completed the previous year, 1907, and set the stage for the conditions observed today. A Federal Emergency Management Agency (FEMA) study estimating the magnitude of potential flood events for the Clark Fork and Blackfoot rivers indicated the 1908 event had a reoccurrence period of slightly greater than 100 years (Atlantic Richfield Company 2001c).

In 1984, the USGS installed a gauging station on the Turah Bridge 3 miles upstream of the Milltown Reservoir on the Clark Fork River. The period of record of this location is less than the other gauging stations (20 years). Discharge records indicate that average flows for the Clark Fork River at this station are 1,223 cfs. The minimum flow was 219 cfs (Aug. 20, 1992) and the peak discharge for this period was 12,400 cfs, which occurred in February 1996. During the 1997 spring flood, flows at this station peaked at 9,870 cfs. This is the most recent flood recorded at this location. Water quality data and discharge for this flood event are presented on Exhibit 2-8, *Surface Water Quality During Spring 1997 Flood Event for Clark Fork and Blackfoot Rivers.*

An episodic event occurred in February 1996. An extended period of cold weather with temperatures of 30 to 40 degrees below zero created thick ice on the Clark Fork and Blackfoot Rivers near and upstream of Milltown. This was followed by a period of rapid warming with rainfall that melted the lower-elevation snowpack. This increased flows in the rivers and began breaking up the ice. As the newly released ice floated, numerous ice jams formed in both rivers. A large ice jam near Bonner caused the water to back up to 16 feet above flood level; as the ice began to move downstream it damaged bridges and other nearby structures. To protect Milltown Dam from ice damage, the operator removed the spillway stanchions and spill panels and opened the radial gate to pass the ice through the reservoir. These actions rapidly lowered the reservoir water level by about 8 feet, which placed the existing, thick reservoir ice cover directly on much of the previously submerged reservoir sediments. As the now-broken-up ice pack moved through the reservoir, pushed by increased upstream flows, the ice mechanically scoured large quantities of metals contaminated sediments. These sediments entered the reservoir water column, dramatically increasing its turbidity, and subsequently entered the lower Clark Fork River. During this event, mean daily flow measured downstream at the USGS gauge at East Missoula on February 9 reached 12,400 cfs, compared to normal seasonal flows of 1,800 to 2,000 cfs.

EXHIBIT 2-8
Surface Water Quality During Spring 1997 Flood Event for Clark Fork and Blackfoot Rivers

	Range	Average	DEQ[2] (WQB) Standard	DWS[4]	FAWQC[3]
Clark Fork River at Turah					
5/7/97 to 6/22/97: 18 sampling events					
Discharge (cfs)	3,840 – 9,870	7,934	N/A	N/A	N/A
Total Recoverable (ppb)[1]					
Arsenic	12 – 23	18	18	N/A	N/A
Cadmium	<1	<1	2/0.3	N/A	N/A
Copper	37 – 110	74	13/9	N/A	N/A
Lead	6 – 21	13	15	N/A	N/A
Zinc	60 – 210	131	119	N/A	N/A
Total Dissolved (ppb)					
Arsenic	6 – 13	8	N/A	10	340/150
Cadmium	<0.10 – 0.13	<0.10	N/A	5	2/0.25
Copper	5.3 – 20	12	N/A	1,300	13/9
Lead	<0.50 – 0.76	<0.50	N/A	15	82/3.2
Zinc	4.2 – 9.9	7	N/A	2,000	120/110
Total Suspended Solids (ppm)	64- 442	236	N/A	N/A	N/A
Blackfoot River at Bonner					
5/19/97 to 6/5/97: 3 sampling events					
Discharge (cfs)	5,130 – 13,400	10,110	N/A	N/A	N/A
Total Recoverable (ppb)[1]					
Arsenic	<1 - 3	3	18	N/A	N/A
Cadmium	<1	<1	2/0.3	N/A	N/A
Copper	3 - 34	15	13/9	N/A	N/A
Lead	<1 - 3	3	15	N/A	N/A
Zinc	<10	<10	119	N/A	N/A
Total Dissolved (ppb)					
Arsenic	1	1	N/A	10	340/150
Cadmium	<0.10	<0.10	N/A	5	2/0.25
Copper	1 – 2.2	1.7	N/A	1,300	18/12
Lead	<0.50	<0.50	N/A	15	82/3.2
Zinc	<3.0 – 3	<3.0	N/A	2,000	120/110
Total Suspended Solids (ppm)	23 – 212	131	N/A	N/A	N/A
Clark Fork River Above Missoula (East Missoula)					
5/13/97 to 6/22/97: 17 sampling events					
Discharge (cfs)	9,940 – 26,300	18,919	N/A	N/A	N/A
Total Recoverable (ppb)[1]					
Arsenic	6 – 14	9	18	N/A	N/A
Cadmium	<1	<1	2/0.3	N/A	N/A
Copper	22 - 63	39	13/9	N/A	N/A
Lead	3 – 14	8	15	N/A	N/A
Zinc	30 – 130	73	119	N/A	N/A
Total Dissolved (ppb)					
Arsenic	3 – 7	4	N/A	10	340/150
Cadmium	<0.10 – 0.12	0	N/A	5	2/0.25
Copper	4.4 – 7.8	6	N/A	1,300	13/9
Lead	<0.50	<0.50	N/A	15	82/3.2
Zinc	<3.0 – 8.3	6	N/A	2,000	120/110
Total Suspended Solids (ppm)	37 – 518	212	N/A	N/A	N/A

Notes:
[1] Values for arsenic are total concentration, values for cadmium, copper, lead and zinc are total recoverable concentration.
[2] Assumes 100 mg/l hardness.
cfs–cubic feet per second; ppb–parts per billion; N/A–Standard not applicable; #/# gives acute/chronic levels
Daily discharge values are calculated by multiplying instantaneous concentration by corresponding stream flow rate then converting to appropriate units. Data from USGS.
[3] Federal Ambient Water Quality Criteria, dissolved, Gold Book, Update 2002; first number is acute standard/second number is chronic standard.
[4] Federal Drinking Water Standard for Human Health, dissolved.

Water quality samples taken downstream over the course of this event indicated much larger concentrations of total and dissolved copper and other metals compared to any previously taken samples, as shown in Exhibit 2-9, *Surface Water Quality During February 1996 Ice Scour Event for Clark Fork River and Milltown Reservoir*. Based on these sample results, EPA directed Atlantic Richfield Company to undertake an additional *Focused Feasibility Study* for the Milltown site. This study was completed in June 2001.

5.4 Remedial Investigation Strategy

The MRSOU is a large, complex site. Data gathering concerning sources of contamination, pathways of migration, and impacts on receptors needed for the *Remedial Investigation* were triggered in the early 1980s with the discovery of arsenic in potable water supplied by several wells to Milltown residents and businesses. Preliminary investigations linked the source of the arsenic to the reservoir sediments, resulting in the installation of a replacement water supply. The complex interaction between the sediments, fluctuating reservoir pool elevations, and local groundwater flow patterns was the focus of numerous field investigations and water quality modeling through 1995. As part of the review process for data, EPA, in concert with DEQ and the Atlantic Richfield Company, established specific Data Quality Objectives (DQOs) for reviewing studies and qualifying existing data sets for incorporation into the overall understanding of site conditions, and ultimately formation of a conceptual model. Under EPA and DEQ direction (with the concurrence of other agencies), Atlantic Richfield Company and their consultants formulated work plans and sampling and analysis plans for subsequent investigations to fill data gaps and complete the characterization of environmental conditions. Pertinent studies and projects for all disciplines are cited in detail in the RI/FS documents.

5.5 Affected Media and Contaminant Types

As described in Section 5.1, *Conceptual Model*, the contaminants are found in media affected by mine wastes. The key media affected by contaminants in the MRSOU include the following:

- **Reservoir sediments:** The primary source of contaminants is the residual mine waste material mixed with sediment and impounded behind the Milltown Dam. As shown in the conceptual model (Exhibit 2-5), the primary pathway from the contaminated sediments to human receptors is through groundwater. Exposure may occur through dermal contact or ingestion. The primary mechanism for arsenic mobilization to pore water is the occurrence of arsenic associated with minerals that are unstable.

EXHIBIT 2-9
Surface Water Quality During February 1996 Ice Scour Event for Clark Fork River and Milltown Reservoir

					Total (ppb)				Dissolved (ppb)				
Sampler	**Location**	**Date**	**Time**	**Discharge (cfs)**	**Arsenic (ppb)**	**Cadmium (ppb)**	**Copper (ppb)**	**Zinc (ppb)**	**Arsenic (ppb)**	**Cadmium (ppb)**	**Copper (ppb)**	**Zinc (ppb)**	**TSS (ppm)**
USGS	CFR below Milltown Dam	2/9/96	9:30	9,080	69	5	400	1,100	9	<1	11	15	824
Missoula Co.	CFR below Milltown Dam	2/9/96	10:30	N/A	54	4	440	1,000	11	<1	<10	30	N/A
Missoula Co.	CFR below Milltown Dam	2/10/96	15:25	N/A	73	6	680	1,220	11	1	30	30	N/A
Missoula Co.	CFR below Milltown Dam	2/10/96	N/A	N/A	69	5	630	1,140	11	2	30	40	N/A
Missoula Co.	CFR below Milltown Dam	2/10/96	N/A	N/A	97	7	770	1,310	12	1	20	30	N/A
Missoula Co.	Milltown Reservoir	2/10/96	16:35	N/A	19	2	310	480	5	2	20	20	N/A
USGS	CFR at Turah Bridge	2/11/96	11:00	4340	23	<1	180	110	13	<0.1	11	22	100
DEQ[1] Water Quality Act Std. (WQB-7)					18	2/0.3	13/9	119	N/A	N/A	N/A	N/A	
FDWS									10	5	1,300	2,100	
FAWQC									340/150	2/0.25	14/9.3	120/120	

Notes:

1. Assumes 100 mg/l hardness.

Data from: USGS and Missoula City-County Health Department
CFR–Clark Fork River
cfs–cubic feet per second
ppb–parts per billion
ppm–parts per million
N/A–Not Available
TSS–Total Suspended Sediment
<–Indicates "non-detect" to the level indicated.
FDWS–Federal Drinking Water Standards
FAWQC–Federal Ambient Water Quality Standards (Gold Book 2002)
#/#–gives acute/chronic levels

Oxidation/reduction of contaminated sediment is the key contaminant dissolution mechanism, producing dissolved arsenic that can migrate from pore water and contaminate surface water and groundwater. Reservoir sediments can also be the source of dissolved and total metals, including copper. Sediment scour by high flows or ice can result in sediment entrainment in the water column and subsequent transport downstream. Aquatic flora and fauna can uptake contaminants directly from the sediment or through the water column.

- **Groundwater:** Movement of arsenic contaminated groundwater into the local aquifer underlying the reservoir and adjacent valley has created a groundwater plume. Local wells in Milltown intercepted the plume resulting in an exposure risk through ingestion. Groundwater flow to surface water can also occur.

- **Surface water:** River water (surface water), as well as contaminated soils in the river, transports both dissolved and sediment-bound metals and arsenic. Inflow of contaminated groundwater can also increase levels of contamination in the surface water.

- **Biological resources:** Metals can be delivered to aquatic and terrestrial organisms from any of the contaminated media listed above. Organisms, including benthic macroinvertebrates, receive the contaminants through direct consumption of contaminated sediment or through absorption in water. These organisms are in turn part of the food chain—for example, macroinvertebrates are eaten by fish and, if contaminated, have been shown to potentially reduce growth of trout (Stratus 2002). Contaminant uptake in plants is a well-documented occurrence and could potentially be the source of problems for streambanks as demonstrated upstream in the Deer Lodge Valley. Spring runoff, floods, and ice scour events generate sediment that is detrimental to benthic macroinvertebrate populations, fish spawning success, other fish, and aquatic mechanisms.

- **Air resources:** Because of sustained moisture content, and various levels of existing vegetation located on the reservoir sediment delta, fugitive dust emanating from these areas during periods of drought or sustained drawdown is not significant and any resulting adverse air impacts are considered to be highly unlikely. Therefore, this air pathway is not of further concern except during remedial action construction.

The remedial actions defined in the Selected Remedy, when implemented, will have beneficial mitigative and corrective effects on the affected media.

5.5.1 Reservoir Sediment—Geomorphology and Characterization

Following construction of the Milltown Dam in 1907, metals enriched sediments transported by the Blackfoot and Clark Fork rivers began to deposit in the newly created reservoir. Investigation of the reservoir sediments has included monitoring wells with well-water sampling and chemical analysis, core sampling and chemical analysis, a cone penetrometer survey, cross sectional surveys, sediment pore water sampling and analysis, sequential extraction and mineralogical analyses, and aerial photo interpretation. Many additional monitoring wells were also installed and sampled in areas outside the reservoir sediments in strategic locations to better define the plume and local hydrogeology. Results of these many investigations are summarized as follows:

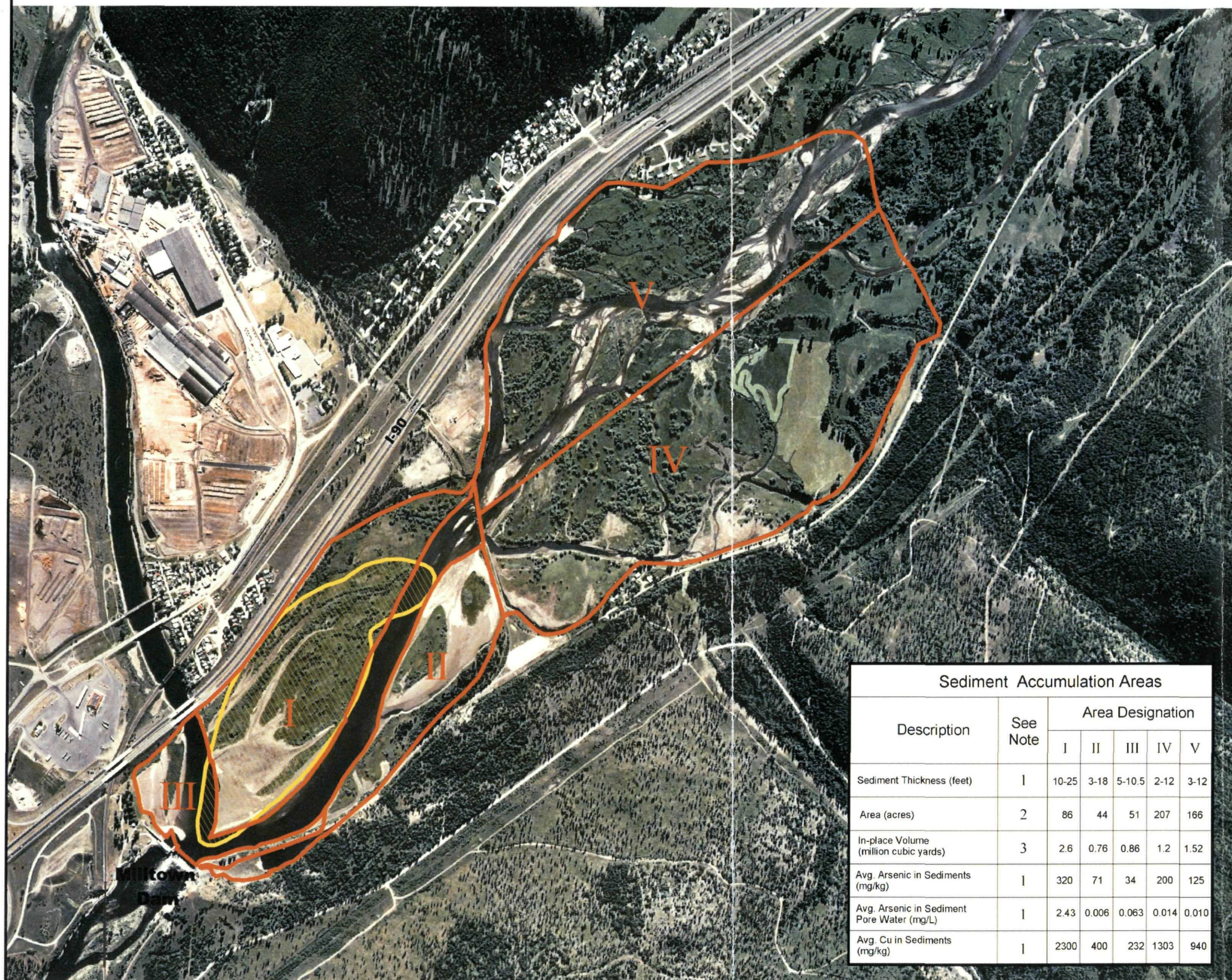
- **Contaminant concentrations within the reservoir sediments are highly variable with location and depth and are inversely proportional to particle size.** Average copper concentrations ranged from 83 mg/kg in sand sized sediment to over 5,000 mg/kg in silt/clay sized sediment (Atlantic Richfield Company 1995). As shown on Exhibit 2-10, *Source Characterization for Sediment Accumulation Areas 1-5, MRSOU*, average sediment copper and arsenic concentrations are highest in Area 1 and lowest in Area 3. Dissolved concentrations of arsenic in pore water are highest in Area 1 but are also elevated in Area 3 with lesser concentrations in Areas 4, 5, and 2, respectively.

- **Historical maps, aerial photo interpretation, and sediment stratigraphy indicate that the historic Clark Fork River channel passed through Area 1** (a portion of the backwater area discussed earlier in this section) and was mostly filled in 1908 with upstream sediments containing historic mining and milling wastes. These historic wastes contained greater concentrations of metals and arsenic than what was generated in later years. As the historic channel filled, it forced the active channel to move over time to the south and west. This hypothesis is supported by the fact that the greater volume of sediments containing the highest contaminant concentrations and greater sediment thicknesses are found in Area 1, and by the fact that the aerial photographs indicate that the reservoir sediments, particularly in Area 1, have been fairly stable in planform during the last 50 years.

- **The total volume of contaminated reservoir sediments for all five areas was earlier estimated at 6.6 million in-place cubic yards** (Atlantic Richfield Company 1995). The greatest volume of finer grained sediments with the highest levels of contamination is contained in Area 1.

- **Comparison of cross-section surveys indicate that both of the river channels within the lower reservoir have changed little during the last 20 years.** Small variations in channel depths during this period indicate that in years with lower average flows, some deposition of in-stream sediment occurs. In years where higher average flows occur, some scour occurs in the river channels. This demonstrates, along with extensive water quality data, that the reservoir is, and has been for the last 20 years, essentially in "dynamic equilibrium" with regard to sediment deposition and scour.

- **Sediment has filled the reservoir to capacity and USGS concludes** (Lambing 1998) **that the reservoir is in a long-term dynamic equilibrium with the incoming sediment load.** The average annual suspended sediment load reaching Milltown Reservoir for the period 1991 through 1997 was 142,000 tons/year, with an average of 148,000 tons/year leaving the reservoir. However, during the low flow years of 1991 through 1995, the reservoir actually accumulated an average of 13,000 tons/year of suspended sediments (about 65,000 tons total). In 1996 and 1997 (two high flow years), a total of about 107,000 tons were scoured from the reservoir. In the low flow years since 1997 (1998 through 2001), the reservoir has again accumulated sediments.



Legend

Approximate Sediment Accumulation Area Boundary

Sediment Pore Water Arsenic >0.1 mg/L (Approximate **Source Sediment Area** for alluvial aquifer 0.02 mg/L arsenic plume)

Sediment Accumulation Areas

Description	See Note	Area Designation I	II	III	IV	V
Sediment Thickness (feet)	1	10-25	3-18	5-10.5	2-12	3-12
Area (acres)	2	86	44	51	207	166
In-place Volume (million cubic yards)	3	2.6	0.76	0.86	1.2	1.52
Avg. Arsenic in Sediments (mg/kg)	1	320	71	34	200	125
Avg. Arsenic in Sediment Pore Water (mg/L)	1	2.43	0.006	0.063	0.014	0.010
Avg. Cu in Sediments (mg/kg)	1	2300	400	232	1303	940

Notes:

1. Information obtained from Final Draft Milltown Remedial Investigation Report (prepared by Titan Environmental Corporation for ARCO, February 1995)
2. *Accumulation Area acreage determined* using tools in ArcView v. 3.2.
3. Accumulation Area volume information obtained from presentation materials at Clark Fork Basin Symposium 2000 (April14-16) based on Harding Lawson's total reservoir estimate of 6.6 million cubic yards (HLA, 1997). More recent cross section data suggests current sediment volumes may more than estimated by HLA (AERL, 1998c).
4. Extents of Source Characterization Sediment Accumulation Areas I-V shown in this figure were modified from Figure ES-3 of the Final Draft Remedial investigation Report. Modifications include exclusion of areas outside the FEMA 100 yr floodplain. Upstream boundary based on approximate extent of area innundated by a maximum pool elevation of 3263.5 feet above MSL.

EXHIBIT 2-10
Source Characterization for Sediment Accumulation Areas 1-5, MRSOU

prepared for

ARCO
ANACONDA MONTANA

N

Emc2

Scale
500 0 500 1000 feet

Date: 09/20/01

Map Number: CFS1-2

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5.5.2 Surface Water Transport of Contaminants

Water quality data from the Clark Fork and Blackfoot rivers near the Milltown Reservoir have been collected for many years by USGS, DEQ, NorthWestern Corporation, Atlantic Richfield Company, FWP, and others. The USGS data set is the most comprehensive, includes total and dissolved metals concentrations, and was collected at numerous times per year. The water quality summary statistics for locations upstream and downstream of the reservoir are found in Exhibit 2-11, *Summary Statistics for USGS Surface Water Quality Data from Sampling Stations Near Milltown Reservoir*, and indicates that water quality, in general, has been acceptable, with the exception of copper and arsenic exceedances of standards. Suspended sediment sampling has also been conducted frequently. The USGS found that total suspended solids (TSS) can be highly correlated to total recoverable concentrations of copper in the surface water.

In addition, during the *Remedial Investigation* (Atlantic Richfield Company 1995), a HEC-6 computer model was run to predict sediment deposition, scour, and transport through Milltown Reservoir for the following scenarios: long-term deposition and various high flow events (up to a 100-year return interval). The results indicated that during low flow years, net sediment deposition occurs in the reservoir. For average flow years, sediment still tends to be deposited, but during high flow years and flood events sediment is consistently scoured from the reservoir. Actual USGS data and observations agree with these modeling results.

Conceptual models for likely events that may cause surface water quality impacts downstream were developed from previously described data/observations and are as follows.

5.5.2.1 Development of Conceptual Models of Events that May Cause Downstream Surface Water Quality Impacts

Surface water quality downstream of Milltown Reservoir can be affected by influent contaminant concentrations originating upstream and passing through the reservoir, as well as by residual metals-enriched sediments released or scoured from the reservoir itself. Several conceptual models were developed to illustrate the primary conditions likely to influence deposition or scour of sediments in the reservoir:

- During low flow periods with the reservoir at normal pool elevation, hydraulic conditions can favor incoming sediment deposition and accumulation (see Exhibit 2-12a, *Conceptual Model – Schematic of Sediment Accumulation During Low Flow Periods*). Impairment of downstream water quality is rarely an issue under these circumstances.
- In contrast, hydraulic conditions that trigger and induce sediment scour from the reservoir have significant potential to adversely affect water quality downstream:
  - Typical late spring snowmelt runoff, other high flow events (greater than 16,000 cfs), or ice scour from shallow portions of the reservoir during normal pool levels (see Exhibit 2-12b, *Conceptual Model – Schematic of Sediment Scouring During High Flow Events*).
  - Operational practices such as rapid and substantial lowering of reservoir pool levels to facilitate maintenance on the dam or to protect the structure from damage by thick ice flows (see Exhibit 2-12c, *Conceptual Model – Schematic of Reservoir Draw Down During Ice Event*).

If the dam were ever to fail, catastrophic environmental effects would occur as the sediments were released.

EXHIBIT 2-11
Summary Statistics for USGS Surface Water Quality Data from Sampling Stations Near Milltown Reservoir

	Total Metals (µg/l)					Dissolved Metals (µg/l)				
	Arsenic	**Cadmium**	**Copper**	**Lead**	**Zinc**	**Arsenic**	**Cadmium**	**Copper**	**Lead**	**Zinc**
Clark Fork River at Turah Bridge (USGS gaging station 12334550) 1985 – 1992										
Sample Number	42	42	41	42	42	42	42	42	42	42
Mean	13.1	0.9	67.1	16.2	126.5	6.3	0.5	6.2	1.7	10.3
Median	8	0.5	30	8.5	50	5	0.5	5	1	8
Minimum	5	0.5	3	0.5	5	4	0.5	2	0.5	1.5
Maximum	110	4	500	100	1100	17	1	25	7	39
Lower Quartile	7	0.5	14	3.25	32.5	5	0.5	3	0.5	5
Upper Quartile	11	1	56	18.25	87.5	7	0.5	7	2.5	12.75
Std. Dev.	18.4	0.8	118.7	22.9	254.4	2.6	0.1	5.0	1.5	8.2
1993 – 1997										
Sample Number	42	42	42	39	42	42	42	42	39	42
Mean	11.0	0.5	36.8	6.4	55.7	6.7	0.1	6.0	0.3	6.7
Median	9	0.5	22.5	5	40	6	0.05	5	0.25	6
Minimum	5	0.5	3	0.5	5	4	0.05	2	0.25	1.5
Maximum	33	1	180	33	270	13	0.1	19	0.9	22
Lower Quartile	7	0.5	12	2	20	5	0.05	3	0.25	4.25
Upper Quartile	14	0.5	48.25	8.5	70	7	0.05	7	0.25	8
Std. Dev.	5.9	0.1	39.8	7.0	52.3	2.2	0.0	3.9	0.1	4.1
DEQ[1] Water Quality Act Std. (WQB-7)	18	2/0.3	13/9	15	120					
FDWS						10	5	1,300	15	2,000
FAWQC						340/150	2/0.25	14/9.3	82/3.2	120/120

EXHIBIT 2-11
Summary Statistics for USGS Surface Water Quality Data from Sampling Stations Near Milltown Reservoir

	Total Metals (μg/l)					Dissolved Metals (μg/l)				
	Arsenic	**Cadmium**	**Copper**	**Lead**	**Zinc**	**Arsenic**	**Cadmium**	**Copper**	**Lead**	**Zinc**
Blackfoot River near Bonner (USGS gaging station 12340000) 1985 – 1992										
Sample Number	34	34	33	34	34	34	34	34	34	34
Mean	1.2	0.7	10.3	7.1	14.9	0.8	0.5	2.5	1.9	5.0
Median	1	0.5	8	5	10	0.5	0.5	2	1.25	3
Minimum	0.5	0.5	0.5	0.5	5	0.5	0.5	0.5	0.5	1.5
Maximum	3	2	34	20	60	2	1	6	8	15
Lower Quartile	1	0.5	6	2	5	0.5	0.5	1	0.5	1.5
Upper Quartile	1	0.5	12	13.25	20	1	0.5	3	2.5	7
Std. Dev.	0.6	0.4	7.5	6.1	13.7	0.4	0.1	1.5	1.9	4.0
1993 – 1997										
Sample Number	25	25	25	23	25	25	25	25	23	25
Mean	1.4	0.5	6.0	2.2	7.2	0.8	0.1	1.4	0.3	2.1
Median	1	0.5	3	0.5	5	1	0.05	0.5	0.25	1.5
Minimum	0.5	0.5	0.5	0.5	5	0.5	0.05	0.5	0.25	1.5
Maximum	4	0.5	34	25	40	2	0.1	7	2	6
Lower Quartile	0.5	0.5	1	0.5	5	0.5	0.05	0.5	0.25	1.5
Upper Quartile	2	0.5	8	2	5	1	0.05	2	0.25	1.5
Std. Dev.	1.0	0.0	8.7	5.0	7.5	0.4	0.0	1.6	0.4	1.3
DEQ[1] Water Quality Act Std. (WQB-7)	18	2/0.3	13/9	15	120					
FDWS						10	5	1,300	15	2,000
FAWQC						340/150	2/0.25	14/9.3	82/3.2	120/120

EXHIBIT 2-11
Summary Statistics for USGS Surface Water Quality Data from Sampling Stations Near Milltown Reservoir

	Total Metals (µg/l)					Dissolved Metals (µg/l)				
	Arsenic	**Cadmium**	**Copper**	**Lead**	**Zinc**	**Arsenic**	**Cadmium**	**Copper**	**Lead**	**Zinc**
Clark Fork River above Missoula (USGS gaging station 12340500) 1989 – 1992										
Sample Number	20	20	19	20	20	20	20	20	20	20
Mean	3.6	0.5	9.7	3.1	17.5	2.7	0.5	2.5	0.6	5.5
Median	3.5	0.5	8	2	10	3	0.5	2	0.5	4
Minimum	2	0.5	2	0.5	5	1	0.5	1	0.5	1.5
Maximum	6	0.5	31	11	60	4	0.5	6	1	16
Lower Quartile	2.75	0.5	4.5	1	10	2	0.5	2	0.5	1.5
Upper Quartile	4	0.5	10.5	3.5	22.5	3	0.5	3	0.625	8
Std. Dev.	1.4	0.0	7.7	3.1	14.3	0.8	0.0	1.2	0.2	4.3
1993 – 1997										
Sample Number	42	42	42	38	42	42	42	42	38	42
Mean	7.3	0.6	26.3	5.1	54.9	3.8	0.1	3.6	0.3	4.4
Median	5	0.5	10.5	2	20	3	0.05	3	0.25	3.5
Minimum	3	0.5	4	0.5	5	2	0.05	2	0.25	1.5
Maximum	69	5	400	78	1100	9	0.1	11	1.2	15
Lower Quartile	4	0.5	7	1	10	3	0.05	2	0.25	1.5
Upper Quartile	7	0.5	21.5	4	37.5	4	0.05	4	0.25	6.75
Std. Dev.	10.2	0.7	61.9	12.7	167.7	1.6	0.0	2.3	0.2	3.4
DEQ[1] Water Quality Act Std. (WQB-7)	18	2/0.3	13/9	15	120					

EXHIBIT 2-11
Summary Statistics for USGS Surface Water Quality Data from Sampling Stations Near Milltown Reservoir

	Total Metals (µg/l)					Dissolved Metals (µg/l)				
	Arsenic	**Cadmium**	**Copper**	**Lead**	**Zinc**	**Arsenic**	**Cadmium**	**Copper**	**Lead**	**Zinc**
FDWS						10	5	1,300	15	2,000
FAWQC						340/150	2/0.25	14/9.3	82/3.2	120/1120

Notes:
1. Assumes 100 mg/l hardness.

Values reported as below detection were used at half the detection limit for statistical analysis.
Data from USGS for the period 1985 through 1997 for Clark Fork River at Turah and the Blackfoot River near Bonner.
Data from USGS for the period 1989 through 1997 for Clark Fork River above Missoula.
FDWS–Federal Drinking Water Standards
FAWQC–Federal Ambient Water Quality Criteria (Gold Book 2002) – first number is Acute Standard/second number is Chronic Standard
#/#–gives acute/chronic levels

5.5.3 Groundwater

Sediments containing arsenic and other metals related to upstream mining activities began to accumulate in the reservoir shortly after the Milltown Dam was built. Studies completed to date have identified the accumulated reservoir sediments as the primary source of arsenic loading to the alluvial aquifer beneath and downgradient of the reservoir. As shown on Exhibit 2-13, *Area of Groundwater Exceeding Federal Water Quality Arsenic Standard*, the 0.01 mg/l (milligram per liter) arsenic concentration contour extends to the north and east under portions of Milltown and northwest of the Blackfoot River, an area about 325 acres. The new Federal drinking water standard of 0.01 mg/l is reflected in these boundaries.

Also shown is the extensive well network developed to monitor groundwater. As noted earlier in Exhibit 2-10, *Source Characterization for Sediment Accumulation Areas 1-5, MRSOU*, the reservoir sediment pore waters exceeding 0.1 mg per liter (ten times higher than the standard) extend throughout most of Area 1 in the reservoir itself. A summary of dissolved arsenic concentrations for these wells are shown in Exhibit 2-14, *Dissolved Arsenic Concentrations in Alluvial Aquifer and Bedrock Wells; 1990 to 2000.*

5.5.3.1 Conceptual Model of Hydrogeologic System

Geochemical conditions within the reservoir sediments have resulted in mobilization of arsenic contained in the sediments. Arsenic is mobilized from the sediments to the sediment pore water and, ultimately, to the alluvial aquifer (groundwater) as a result of geochemical and hydrogeological conditions in the sediments. Once in the groundwater, arsenic concentrations decrease rapidly because of dilution and geochemical reactions that remove arsenic from solution. The reservoir sediments are the primary source of arsenic to the alluvial aquifer; however, only a portion of the sediments contribute to arsenic exceedances in the alluvial aquifer. Pore water arsenic concentrations in portions of the sediments outside of Area 1 are commonly below the new Federal standard of 0.01 mg/l.

Additionally, pore water concentrations need to be significantly higher than 0.01 mg/l arsenic to result in arsenic exceedances in the alluvial aquifer, because of dilution and geochemical reactions that attenuate arsenic concentrations along the flow path from the sediments to the alluvial aquifer. The conceptual hydrogeologic model was shown earlier in Exhibit 2-5, *Conceptual Model: Cross-Section of Hydrogeological System and Geochemical Processes in Milltown Reservoir.*

5.5.3.2 Nature and Extent of Arsenic

Arsenic is associated with different minerals in the reservoir sediments. Arsenic mobilization from the sediments depends on mineral association and geochemical conditions. The results of laboratory tests indicate that approximately 10 percent of the total arsenic in the sediments is adsorbed to iron oxyhydroxides. Iron oxyhydroxides are stable under oxidizing conditions but unstable under reducing conditions. A large portion of the sediments are in a reducing zone, resulting in the potential mobilization of arsenic from oxyhydroxides in this zone.

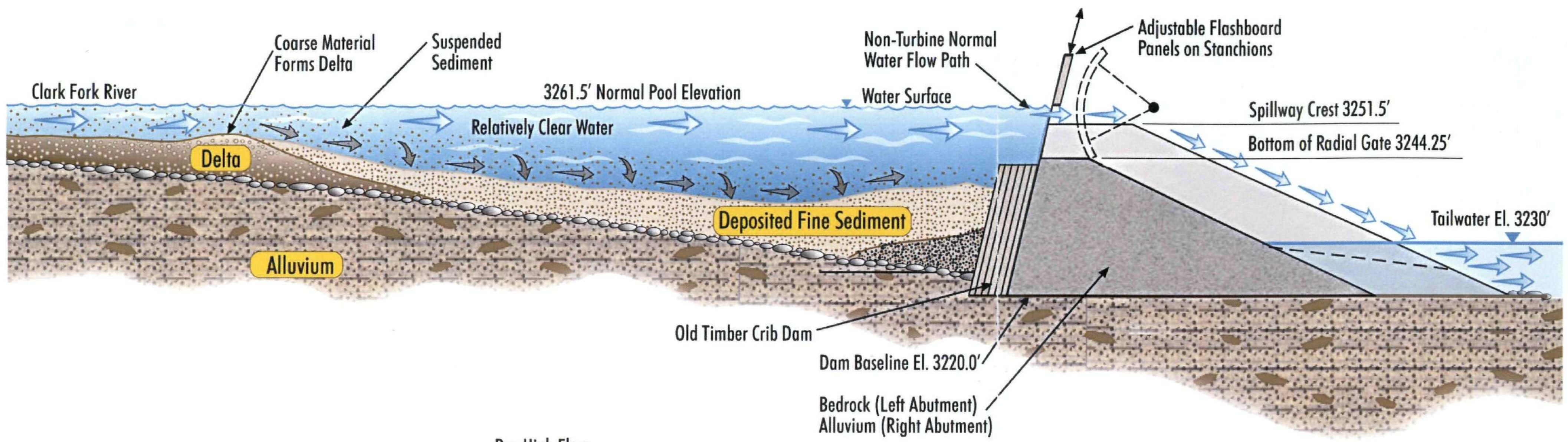


EXHIBIT 2-12a
Conceptual Model—Schematic of Sediment Accumulation During Low Flow Periods

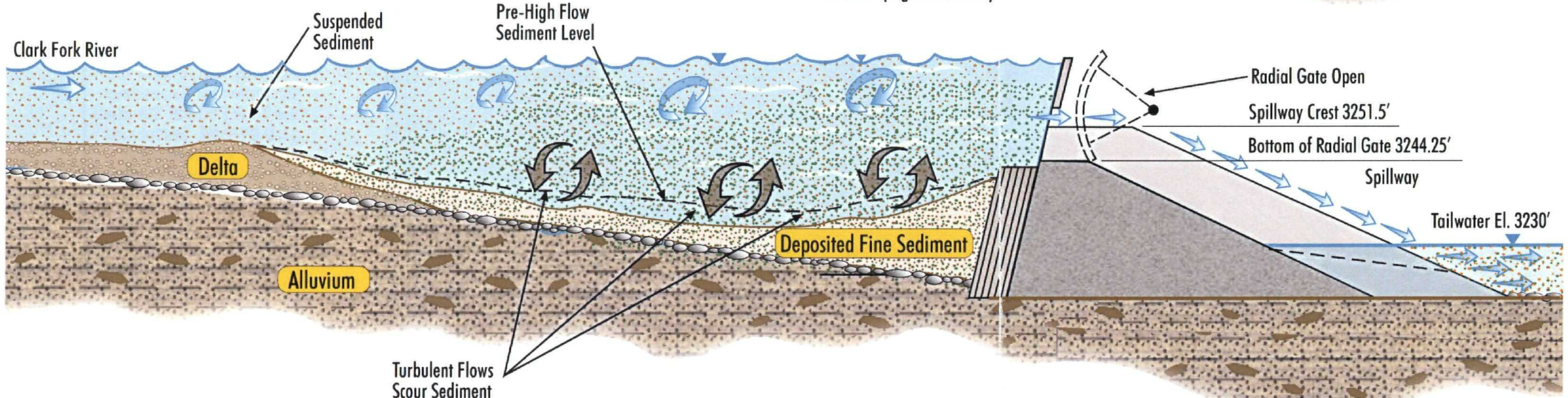


EXHIBIT 2-12b
Conceptual Model—Schematic of Sediment Scouring During High Flow Events

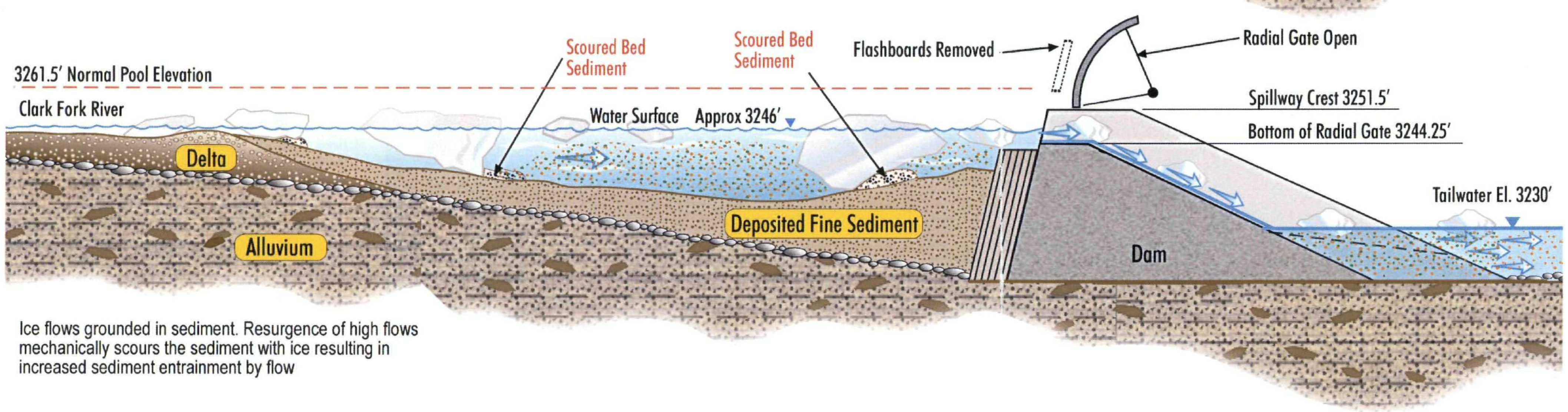
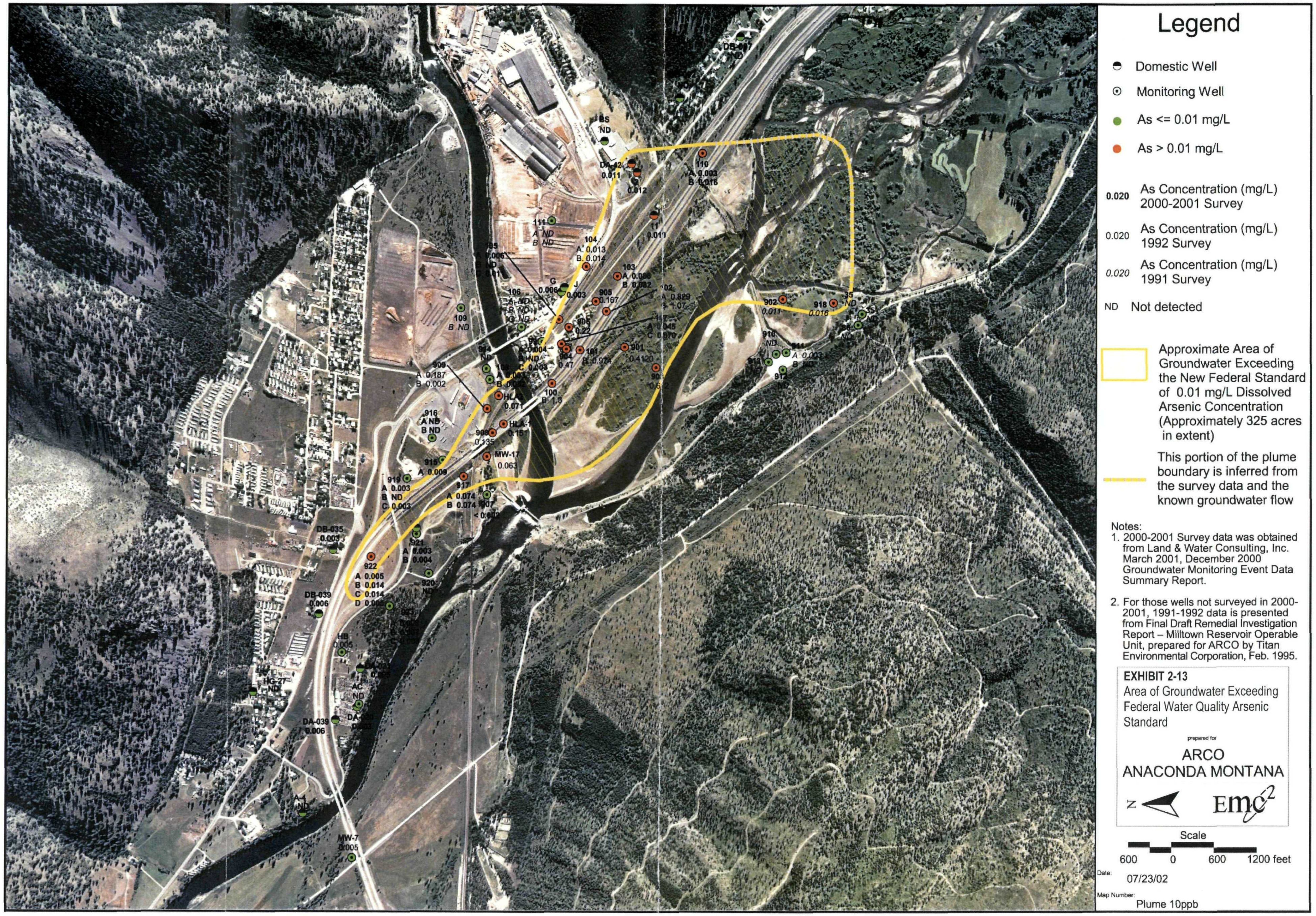


EXHIBIT 2-12c
Conceptual Model—Schematic of Reservoir Draw Down During Ice Event



Legend
Domestic Well
Monitoring Well
As <= 0.01 mg/L
As > 0.01 mg/L
0.020 As Concentration (mg/L) 2000-2001 Survey
0.020 As Concentration (mg/L) 1992 Survey
0.020 As Concentration (mg/L) 1991 Survey
ND Not detected
Approximate Area of Groundwater Exceeding the New Federal Standard of 0.01 mg/L Dissolved Arsenic Concentration (Approximately 325 acres in extent)
This portion of the plume boundary is inferred from the survey data and the known groundwater flow
Notes:
1. 2000-2001 Survey data was obtained from Land & Water Consulting, Inc. March 2001, December 2000 Groundwater Monitoring Event Data Summary Report.
2. For those wells not surveyed in 2000-2001, 1991-1992 data is presented from Final Draft Remedial Investigation Report – Milltown Reservoir Operable Unit, prepared for ARCO by Titan Environmental Corporation, Feb. 1995.
EXHIBIT 2-13
Area of Groundwater Exceeding Federal Water Quality Arsenic Standard
prepared for
ARCO
ANACONDA MONTANA
N
Emc2
Scale
600 0 600 1200 feet
Date: 07/23/02
Map Number: Plume 10ppb

EXHIBIT 2-14
Dissolved Arsenic Concentrations (ppm) in Alluvial Aquifer and Bedrock Wells: Monitoring between 1990 to 2001

Well No.	Dates Sampled	Number of Samples	Maximum	Minimum	Standard Deviation	Mean
Upgradient Area						
35	1990-1991	2	0.0000	<0.0020	0.00	0.0000
36	1990-1991	2	0.0000	<0.0020	0.00	0.0000
110A	1990-1991, 1996-2003	14	0.0060	<0.0020	0.00	0.0017
110B	1990-1991, 1996-2003	15	**0.0180**	0.0050	0.00	**0.0133**
902	1990-1991	2	**0.0210**	**0.0100**	0.01	**0.0155**
918	1991	1	**0.0160**	**0.0160**	-	**0.0160**
2	1996-2001	10	**0.0130**	0.0030	0.00	0.0096
DA42	2000-2003	6	**0.0120**	0.0080	0.00	0.0095
BS	2000-2003	6	0.0020	<0.0020	0.00	0.0005
DB7	2000-2003	6	0.0030	<0.0020	0.00	0.0005
Upland Disposal Area						
910A	1990-1991	2	0.0000	<0.0020	0.00	0.0000
910B	1990	1	0.0050	0.0050	-	0.0050
911A	1990-1991	2	0.0030	<0.0020	0.00	0.0015
911B	1990-1991	2	0.0000	<0.0020	0.00	0.0000
912	1990-1991	2	0.0000	<0.0020	0.00	0.0000
913A	1990-1991	2	0.0000	<0.0020	0.00	0.0000
913B	1991	1	0.0000	<0.0020	-	0.0000
Arsenic Plume Area						
100A*	1990-1992	4	**1.2500**	**1.0100**	0.10	**1.1275**
100B	1990-1992	4	**1.4800**	**1.2600**	0.11	**1.3725**
101B	1990-1992	4	**1.0700**	**0.9410**	0.06	**0.9903**
102A	1990-1992	4	**0.8740**	**0.8050**	0.03	**0.8340**
102B	1990-1992	4	**1.0700**	**0.8060**	0.13	**0.9288**
103A	1991, 1997-2002	12	**0.2200**	**0.0120**	0.06	**0.0923**
103B	1990-1992, 1995-2002	18	**0.2300**	**0.0420**	0.05	**0.0896**
107A*	1997-2002	10	**0.7160**	**0.2140**	0.17	**0.5380**
107B*	1990-1992	4	0.0050	<0.0020	0.00	**0.0025**
107C*	1990-1992, 1995-2001	16	**1.4500**	**0.0880**	0.42	**0.7865**
901	1990-1992	4	**0.4150**	**0.3200**	0.04	**0.3785**
903	1990-1992	4	**0.6120**	**0.3790**	0.11	**0.4865**
904	1990-1992	4	**0.9920**	**0.2340**	0.32	**0.5938**
905	1990-1992, 2001	5	**0.6270**	**0.1580**	0.20	**0.2920**
908	1990-1992	4	**0.2910**	**0.0160**	0.11	**0.1465**
909A	1990-1992	4	**0.1870**	**0.0900**	0.04	**0.1295**
909B	1990-1992	4	0.0030	<0.0020	0.00	0.0015
917A	1991-1992, 1995-2002	17	**0.3400**	0.0010	0.12	**0.1322**
917B	1991-1992, 1995-2002	17	**0.2800**	0.0050	0.08	**0.1032**
HLA-1	1990-1992	4	**0.1510**	**0.0770**	0.03	**0.1233**
HLA-2	1990-1992, 1995-2003	19	**0.1050**	0.0030	0.03	**0.0517**
M-17	1990-1992	4	**0.0760**	**0.0430**	0.01	**0.0595**
11	1995-2003	13	**0.0330**	**0.0170**	0.01	**0.0244**
Northern Hydraulic Boundary Area						
99A	1990-1991, 1995-2003	17	0.0070	<0.0050	0.00	0.0024
99B	1990-1991, 1995-2003	17	0.0060	<0.0050	0.00	0.0020
99C	1995-2003	15	0.0050	<0.0050	0.00	0.0023
104A*	1990-1991, 1996-2003	15	**0.0160**	0.0060	0.00	**0.0102**
104B*	1990-1991, 1996-2002	14	**0.0150**	0.0070	0.00	**0.0123**
105A	1990-1991, 1996-2003	15	0.0080	0.0020	0.00	0.0050

EXHIBIT 2-14

Dissolved Arsenic Concentrations (ppm) in Alluvial Aquifer and Bedrock Wells: Monitoring between 1990 to 2001

Well No.	Dates Sampled	Number of Samples	Maximum	Minimum	Standard Deviation	Mean
105B	1990-1991, 1996-2003	15	0.0050	<0.0020	0.00	0.0019
105C	1990-1991, 1996-2003	15	**0.0130**	<0.0020	0.00	0.0065
106A	1990-1991	2	0.0000	<0.0020	0.00	0.0000
106B	1990-1991	2	0.0000	<0.0020	0.00	0.0000
106C	1990-1991	2	0.0000	<0.0020	0.00	0.0000
108A	1990-1991, 1996-2003	15	0.0060	<0.0020	0.00	0.0016
108B	1990-1991, 1996-2003	15	0.0060	<0.0020	0.00	0.0018
109A	1990	1	0.0000	<0.0030	-	0.0000
109B	1990-1991	2	0.0040	<0.0020	0.00	0.0020
111A	1990-1991, 1997, 2001-2003	8	**0.5400**	<0.0020	0.19	**0.0684**
111B	1990-1991, 2001-2003	7	0.0020	<0.0020	0.00	0.0009
906	1990-1991, 1995-2000	13	**0.4000**	<0.0030	0.13	**0.1444**
914	1990-1991	2	0.0000	<0.0020	0.00	0.0000
915A	1990-1992, 1995-2003	19	**0.0270**	<0.0020	0.01	0.0066
916A	1991-1992, 1997-2003	15	0.0050	<0.0010	0.00	0.0019
916B	1991-1992, 1997-2003	15	0.0060	<0.0010	0.00	0.0023
G	1996-2003	13	**0.0270**	<0.0005	0.01	0.0074
J	1996-2003	13	0.0070	0.0020	0.00	0.0044
Downgradient Area						
907	1990-1992, 1995-2001	16	0.0040	<0.0020	0.00	0.0011
919A	1991-1992, 1996-2003	16	0.0040	<0.0020	0.00	0.0025
919B	1991-1992, 1996-2003	16	0.0080	<0.0020	0.00	0.0027
919C	1991-1992, 1996-2003	16	0.0080	<0.0020	0.00	0.0033
920	1991-1992, 1995-2001	15	**0.0280**	<0.0005	0.01	0.0058
921A	1991-1992, 1995-2003	18	0.0090	<0.0020	0.00	0.0053
921B	1991-1992, 1995-2003	17	**0.0270**	<0.0020	0.01	0.0029
922A	1991-1992, 1995-2003	17	0.0050	0.0000	0.00	0.0030
922B	1991-1992, 1995-2003	17	**0.0150**	0.0030	0.00	**0.0113**
922C	1991-1992, 1995-2003	17	**0.0150**	0.0070	0.00	**0.0125**
922D	1995-2003	15	**0.0150**	0.0090	0.00	**0.0133**
923A	1991-1992, 1995-2003	17	0.0090	<0.0005	0.00	0.0047
923B	1991-1992, 1995-2003	17	0.0080	<0.0005	0.00	0.0058
923C	1995-2003	15	**0.0110**	0.0030	0.00	0.0078
AC	1991-1992	2	0.0000	<0.0010	0.00	0.0000
HB	1991-1992	2	0.0050	0.0040	0.00	0.0045
MW-3	1995-1996	2	0.0000	<0.0005	0.00	0.0000
MW-6	1995-1996	2	0.0000	<0.0005	0.00	0.0000
MW-7	1995-2003	15	0.0080	0.0030	0.00	0.0042
HG-27	1995-2003	14	0.0030	<0.0005	0.00	0.0009
A4	1995-2001	11	0.0040	<0.0005	0.00	0.0018
DA21	2000-2003	5	0.0050	0.0020	0.00	0.0032
DA20	2000-2003	6	0.0030	<0.0020	0.00	0.0008
DA39	2000	1	0.0060	0.0060	-	0.0060
DB35	2000-2001	2	0.0030	0.0020	0.00	0.0025
DB39	2000-2003	6	0.0050	0.0020	0.00	0.0040

Notes:

*Bedrock well

Red, bold text indicates that the concentration is at or above the Federal standard of 0.01 ppm for dissolved arsenic.

A less-than symbol (<) indicates that the concentration is less than the laboratory limits of detection.

The largest percentage of arsenic is bound within residual minerals, primarily sulfides. In contrast to oxyhydroxides, sulfides are stable under reducing conditions, but unstable under oxidizing conditions. However, mobilization of arsenic from residual minerals located in the oxidized portion of sediments is limited. This is because the arsenic concentration in oxidized water is kept low by adsorption onto oxyhydroxides. Approximately 0.3 percent of the total arsenic in the sediment samples—pore water and solid sediment material combined—is present as dissolved arsenic. Arsenic pore water concentrations average 2.4 mg/l in the reservoir sediments immediately upstream of the dam and southeast of Milltown. In this area, sediment accumulations are deep and characterized by high total arsenic concentrations. In other areas, sediments are thinner or composed predominantly of coarse-grained sediments. These thinner or coarse-grained sediment areas have much lower average pore water arsenic concentrations and are not considered to contribute to the arsenic concentration exceedances observed in the Milltown alluvial aquifer.

5.5.3.3 Fate and Transport of Arsenic

Arsenic enters groundwater via movement of pore water through the reservoir sediments and to the alluvial aquifer, which is in direct contact with the sediments. The primary arsenic transport route is groundwater flow in a northeastern direction toward Milltown. The groundwater flow is bounded on the southwest by the "no-flow" boundary of the bedrock outcrop and to the west by the dam, which cause the flow within the alluvial aquifer to bend sharply around the dam and then to the west. Exhibit 2-15, *Alluvial Aquifer Potentiometric Surface Map*, indicates the direction of groundwater flow.

5.5.3.4 Arsenic Depletion from Reservoir Sediments

Arsenic can be mobilized from the sediments depending on mineral association and geochemical conditions, which gradually depletes the source of arsenic. Assuming the geochemical zones continue to be stable, the mass of arsenic available to enter the pore water was calculated to be approximately 430 tons. Based on flux estimates through the reservoir sediments, the arsenic loading rate to the alluvial aquifer has been estimated to be from 2 to 20 pounds per day. At this rate, assuming no addition of available arsenic from deposition of additional sediments from upstream or change in extent of geochemical zones, it will take between 200 and 2,000 years to deplete the arsenic source. This approximation assumes linear mobilization of arsenic from minerals in the sediment to the pore water. Realistically, pore water concentrations will decrease gradually over time, resulting in a longer time for arsenic depletion but with lower concentrations.

5.5.3.5 Arsenic Migration

A downward hydraulic gradient through the reservoir sediments is the primary mechanism for arsenic introduction into the alluvial aquifer. Alluvial water quality data indicates that the downgradient extent of elevated arsenic concentrations in the groundwater is limited by dilution and adsorption mechanisms that reduce arsenic concentrations. Arsenic from the reservoir sediments is diluted by the large alluvial groundwater flow by a factor of five as the water leaving the reservoir sediments mixes with the shallow aquifer beneath the sediments. Dilution is also important along the boundaries of the area with arsenic concentrations in groundwater exceeding 0.01 mg/l, decreasing concentrations by gradual mixing of the pore water with the alluvial aquifer. Adsorption also affects the extent of the arsenic in groundwater by removing arsenic from solution along the flow path through geochemical processes. In particular, adsorption to iron oxyhydroxides would be expected under the less reducing conditions present in the alluvial aquifer. A mass balance flow tube analysis completed as part of the *Remedial Investigation* suggested that adsorption could be a significant mechanism for reducing groundwater arsenic concentrations to low levels, particularly in the downgradient portion of the area. The natural mechanisms of dilution and adsorption, which provide a control on the extent of arsenic migration, will continue to operate. Significant changes in oxidation conditions or flow in the alluvial aquifer are unlikely because of the site location at the convergence of two rivers, which provides a constant, massive flow of oxidized water.

5.5.3.6 Source Area for Groundwater Arsenic Plume

Arsenic concentrations in the sediment pore water decrease rapidly upon entering the alluvial aquifer as a result of dilution and adsorption processes. For this reason, sediment pore water arsenic concentrations significantly higher than the new Federal Drinking Water Standard (FDWS) of 0.01 mg/l are required to represent a significant source contributing to arsenic exceedances in the alluvial aquifer. For the purpose of the RI/FS evaluations, sediments with pore water arsenic concentrations sufficiently elevated to potentially cause exceedances of arsenic standards in the alluvial aquifer are called source sediments. The source sediment area was delineated using pore water concentrations at least five times higher than the existing 0.018 mg/l Montana Numeric Water Quality Standard for arsenic, or 0.1 mg/l. The factor of five was derived to represent the initial dilution-related reduction in arsenic concentrations that is thought to occur as the sediment pore water mixes with the underlying alluvial aquifer. The initial dilution-related reduction, assuming complete mixing of waters, was estimated by comparing the 200,000 cubic feet per day vertical pore water flux through the sediments with the 1,000,000 cubic feet per day flux flowing in the shallow alluvial aquifer underneath the sediments (a potential 1-to-5 reduction ratio). Arsenic concentrations are further reduced along the flow path as the shallow alluvial aquifer flow mixes with the larger deep alluvial aquifer flow beneath and downgradient of Milltown and as adsorption removes arsenic from solution. However, to be conservative, only the initial approximately five-fold dilution reduction is assumed for delineating the source sediment area.

The source sediments occupy that portion of reservoir located immediately southwest of Milltown and compose the majority of Area 1 and a small part of Area 3. The estimated volume of source sediments responsible for the plume is 2 to 3 million cubic yards (mcy). The delineated source sediment area contains the thickest deposits of fine-grained silts and clays. Sediments located further upstream are generally thinner, coarser-grained, and have lower total arsenic and much lower pore water arsenic concentrations.

EXHIBIT 2-15
Alluvial Aquifer Potentiometric Surface Map

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5.6 Biological Resources

5.6.1 Wetlands

Wetlands throughout the reservoir area were delineated by USFWS during summer 1990 (USFWS 1991). A total of 297 acres of jurisdictional wetland, 125 acres of shallow water habitat, and 45 acres of deep-water habitat were identified under normal operating pool levels. A high diversity of wetland habitat types is distributed in a complex mosaic over the site. Palustrine wetlands were dominant. Willow, water birch, and mountain alder dominate the scrub-shrub wetlands. Common understory plants included redtop bentgrass, beaked sedge, Baltic rush, common tansy, and field horsetail. Balsam poplar trees occur in scattered groves in the upper reservoir area. Emergent wetlands were mainly dominated by cattail and hardstem bulrush. Aquatic beds were dominated by pondweed and small duckweed.

5.6.2 Fisheries and Macroinvertebrates

Fisheries resources in the Milltown section of the Clark Fork River, including the reservoir, have been monitored since 1979. Salmonids are present, with rainbow and brown trout as the dominant species. Rainbow trout are more common below the dam, as are large-scale and longnose suckers, mountain whitefish, northern pikeminnow, longnose dace, and sculpins. In contrast, brown trout are more abundant in the Clark Fork River just above the reservoir. Bull trout, cutthroat trout, and brook trout have also been identified in the Clark Fork River drainage. The shallow and weedy backwater of the reservoir also provides good spawning and rearing habitat for a healthy population of northern pike (*Esox lucius*). These pike are a nuisance fish and are detrimental to trout species. Northern pike are predators of trout and other fishes, and are detrimental to recreational and native fish populations.

DEQ has conducted benthic macroinvertebrate surveys annually since 1986. These are considered an indicator of water quality. At the Clark Fork River USGS Turah Bridge station, upstream of Milltown Dam, bio-integrity was non-impaired in 2003. Slight metals pollution was indicated at this site in 1986, 1990, and 1997. The Blackfoot River site has been one of the healthiest sites in the study area. Slight impairment was detected from 1986 through 1989 and was attributed to reduced sediment transport and drought. High flows during 1997 slightly impacted the Blackfoot River site. Below Milltown Dam, bio-integrity was slightly impaired in 2003, although not corroborated with organic or metal sensitive metrics. The population metrics used indicate no metals pollution had been observed since 1990, although nutrient-organic pollution has been evident, as indicated in the benthic macroinvertebrate studies.

EPA, through USGS, has conducted macroinvertebrate sampling since 1986 to evaluate the ecological impacts of mine wastes and the linkage between metal loads in the aquatic system, biological exposure, and impacts on community structure. Data from the Clark Fork at Turah (above Milltown) and the above Missoula site (below Milltown) indicate that macroinvertebrates have accumulated higher levels of copper, lead, and zinc from the Clark Fork River water and sediment than the reference site located on Rock Creek.

5.6.3 Wildlife

The reservoir area provides habitat for a variety of wildlife species. Big game species include white-tailed deer and elk. Small fur bearers include beaver, muskrat, and an occasional mink. Small mammals include meadow voles, house mice, deer mice, and the masked shrew. USFWS conducted bird surveys at the reservoir in 1990. Active breeders that use the area throughout the year include waterfowl, such as grebes, herons, swans, ducks, cormorants, and mergansers; raptors such as hawks, eagles, osprey, and kestrels; and song birds and other bird species, such as doves, pheasants, hummingbirds, and woodpeckers.

5.6.4 Threatened and Endangered Species

Bald eagles and bull trout occur in the reservoir area and are the key threatened and endangered species of concern. Bald eagles historically are present and are frequently seen along the Clark Fork River. Bull trout migration through this area, which is considered important for protection of the species in the Clark Fork River, is presently blocked by the Milltown Dam. During spawning season, some of the bull trout that gather below the dam are captured by netting, transported upstream of the dam, and released. From 1998 to 2002, three to eleven bull trout per year were captured and transported through this program.

5.7 Important Cultural and Historical Features

EPA and FERC, both of whom were involved in the selection and approval of Milltown Project activities, conclude that the National Historic Preservation Act (NHPA) applies to the Milltown Project activities. The following describes an approach that will be used at the MRSOU to investigate cultural and historic resources in compliance with National Historic Preservation Act and the Montana State Historic Preservation Office (SHPO) requirements:

- Atlantic Richfield Company, as required by EPA, completed an historical assessment and inventory of the area. Additionally, FERC conducted historical assessment activities under prior FERC related actions at the site. Together, these assessments recommended the Milltown Dam eligible for the NRHP as an historic district. The contributing elements of the district are the dam, powerhouse, divider block, right abutment, and three houses with their shed and garages lying north of the dam.

- As part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, both the State and EPA conducted an analysis of alternatives to avoid the destruction of the Milltown Dam. Initially, EPA conducted a lengthy and detailed alternative analysis through a series of three *Feasibility Studies*, as described in Section 2, *Site History and Enforcement Activities*. These studies considered a range of cleanup alternatives at the MRSOU that included leaving the dam in place and the area relatively undisturbed, to removal of the in-stream dam only, to removal of the dam and related structures such as the powerhouse, divider block, and right abutment. The *Feasibility Study* process included extensive public involvement and historical resources coordination, and described the effects of alternatives on those resources. All three *Feasibility Studies*, as well as EPA's *Original Proposed Plan* (April 2003) and the *Revised Proposed Plan* (May 2004), were subject to public comment. EPA's *Proposed Plan* called for the removal of the in-stream dam and related sediments, under EPA's CERCLA remedial authority. In May 2003, the State released its DCRP under its CERCLA authority as lead natural resource trustee for natural resource restoration. This plan complemented EPA's plan and utilized EPA's prior alternatives analysis, and added additional cleanup requirements such as the removal of the right abutment, divider block, and powerhouse—all necessary to meet the restoration requirements of CERCLA. In response to public comment on the *Original Proposed Plan*, and in response to the overwhelmingly favorable public comment on the State's restoration plan, EPA issued a *Revised Proposed Plan* in May 2004. That plan modified EPA's cleanup plans for the sediment, recognized the State's DCRP plan, and described how the two plans could be completed at the same time. After consideration of public comment, the State finalized its DCRP and responded to public comments, including detailed responses to comments on the powerhouse removal and its historical features.

- The combined analysis by the two entities with responsibility for CERCLA action at the Milltown Site is that the Milltown Dam Complex must be removed to satisfy the statutory mandates of CERCLA. Public comment was solicited on these actions and fully considered by the agencies.

- The EPA assessment also identified aboriginal sites used by the CSKT as potentially eligible for NHPA protection. EPA has worked with the CSKT to map and evaluate these sites. A comprehensive list of all eligible or listed resources affected by the project is being compiled. EPA and the State believe that harm to these sites can be avoided through the careful design of the reconstruction and revegetation activities for the Milltown Project. If avoidance cannot occur after further and detailed engineering work occurs, EPA and the State will work with the CSKT to identify appropriate mitigation activities.

- EPA and FERC, in coordination with DOI, will work with the CSKT and SHPO to complete a Memorandum of Agreement for the Milltown Project to describe the avoidance and mitigation decisions, procedures for addressing sites if avoidance cannot occur, and procedures for protecting undiscovered protected resources at the Milltown Site. EPA and FERC, in coordination with DOI, will also develop a Historical Preservation and Mitigation Plan to describe the required mitigation efforts for the resources at the site which cannot be avoided during site cleanup—most notably the Milltown Dam Complex structures.

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6 Current and Potential Future Land and Water Uses

Exhibit 2-16, *Land Use and Future Water Needs Analysis Area,* summarizes current land use in the MRSOU area. Exhibit 2-16 also summarizes potential future water needs for areas that are within or adjacent to the arsenic plume. These future water needs and how they might be addressed under groundwater ICs are discussed in more detail in Section 6.2.

6.1 Current and Anticipated Future Land Uses

The area around the MRSOU is located outside of Missoula's urban service area and consists of both zoned and unzoned land, as shown on Exhibit 2-17, *100-Year Floodway and Missoula County Zoning Map.* A majority of the developed land is zoned and the majority of the undeveloped land is unzoned. The Missoula Urban Comprehensive Plan 1998 Update shows the same land uses for Milltown as shown on Exhibit 2-16. Although the plan does not specify future land uses, it requires that zoning changes be made only after considering the impacts on human health, the environment, and the livability of the community.

Current landowners within the area of arsenic concentrations in groundwater exceeding 0.01 mg/l consist of NorthWestern Corporation, Champion International, Town Pump, Inc., Lutheran Church, Catholic Church, the interstate and railroad right-of ways, 35 homeowners and one commercial establishment in Milltown. NorthWestern Corporation's property located to the north of the Milltown Dam, identified as Area G on Exhibit 2-16, is reserved for hydroelectric reservoir and recreational use. The majority of NorthWestern Corporation's property is located within the flood plain upstream of the dam and is restricted by locally adopted flood plain regulations. As stated in the regulations, no permanent structures that would reduce the carrying capacity of the floodway may be placed in the 100-year floodway. The entire reservoir basin and flat lands south of 1-90 are located in the floodway, as are other areas adjacent to the Blackfoot and Clark Fork Rivers within the analysis area which are identified on Exhibit 2-17 as Area A.

Three landfills are located within the site area and are identified as Area C—two are onsite. Champion International Inc.'s former ash disposal landfill is located just beyond the downgradient extent of the arsenic plume area, and the Upland Disposal Site and Disposal Site No. 1 are located in the southern portion of the assessment area. These areas are designated as locations that are for the impoundment and storage of wastes; thus, future development is not reasonably anticipated and will need to be restricted to prevent damage to landfill caps.

An area of land identified as Area H on Exhibit 2-16, is located immediately to the north west of the Champion ash landfill. This area is presently being developed into a trailer park containing about 20 lots.

Town Pump, Inc., which purchased the former Stimson Lumber Company timber office property located just north of 1-90 (identified as Area 1 on Exhibit 2-16), has developed a petroleum retailing station and truck stop on the land. The interstate and railroad right-of-ways, identified as Area B are not available for development, in contrast to two areas identified as Area D, which are adjacent to right-of-ways and floodways with no access.

Area E represents a portion of Milltown containing the 35 homeowners and one commercial establishment in Milltown. The adjacent land, Area F, is referred to as "Remainder D" and may potentially be developed for residential use.

Additional existing land use in the southeast and southwest portions of the reservoir area includes open space and residential use in the Bonner Junction Community. Located northeast of I-90 are residential areas in the communities of Milltown, Bonner, Piltzville, West Riverside, and Pine Grove. The reservoir area currently supports a diverse ecosystem typical of riparian areas of western Montana. Reservoir uses, including boating, fishing, hunting, and other recreational activities, are managed by the State of Montana.

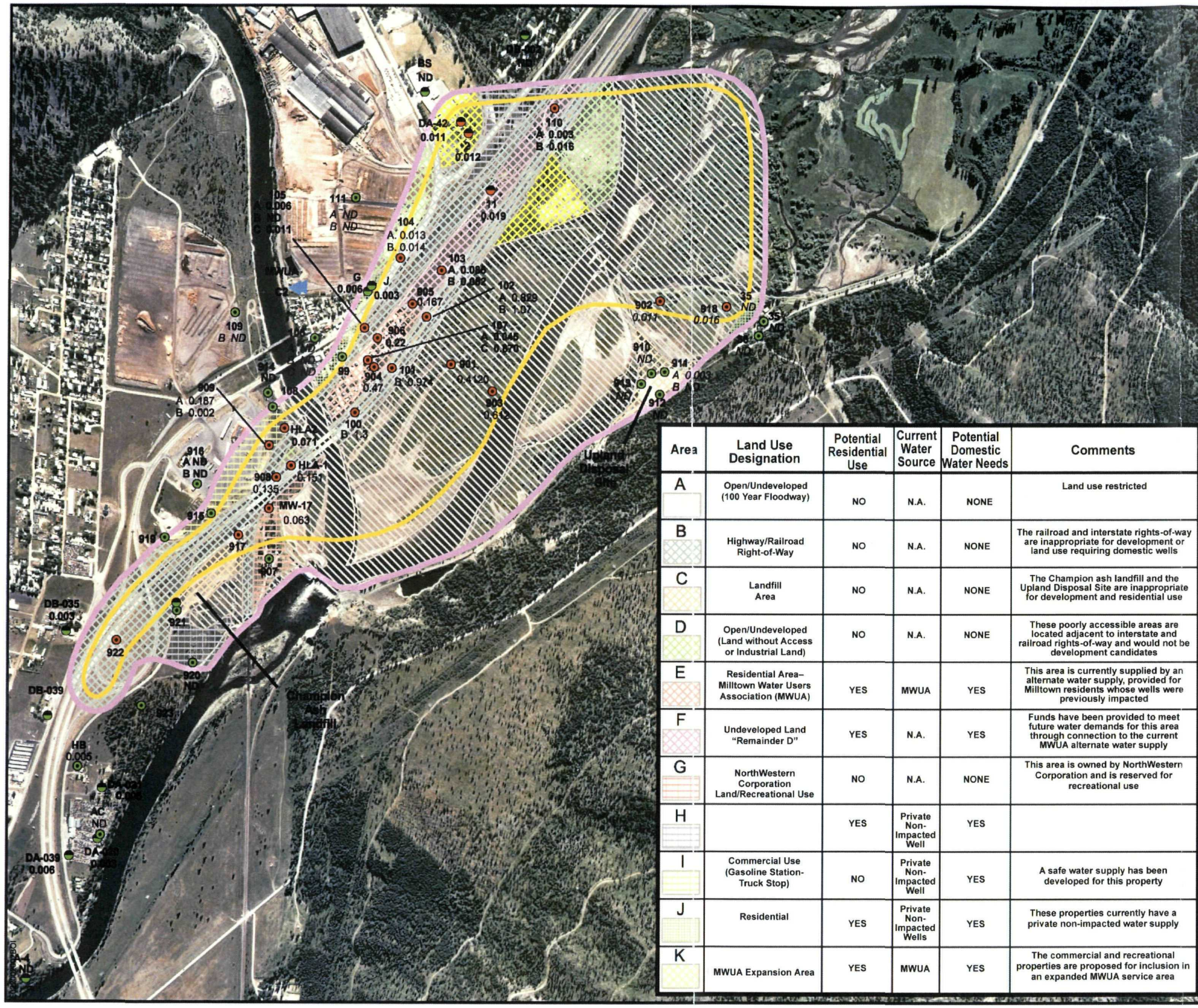
6.2 Groundwater and Surface Water Uses

To determine potential future water needs within the contaminated groundwater area, an analysis of reasonably anticipated future land use and future water needs was conducted. The assessment area, which corresponds with the proposed groundwater area around the 0.01 mg/l arsenic plume, is shown on Exhibit 2-16. Landowners within the groundwater area consist of NorthWestern Corporation, Champion International, Town Pump, Inc., the interstate and railroad right-of-ways, 35 homeowners and one commercial establishment located in Milltown. Historically, the aquifer was used as a drinking water source until the 1984 *Record of Decision* provided a temporary alternative water supply. No permanent ICs preventing groundwater use exist, and permanent ICs restricting groundwater use are opposed by Missoula County. The State classifies the aquifer as usable for drinking water, and it is also classified as a sole source aquifer.

The assessment area was divided into functional areas, shown on Exhibit 2-16 based on current and potential uses of the property to determine potential water needs. The following summarizes the land use as it pertains to future water needs for each of the functional areas.

NorthWestern Corporation's property located to the north of the Milltown Dam and identified as Area G is reserved for recreational use. The majority of NorthWestern Corporation's property is located within the flood plain upstream of the dam and is restricted by locally adopted flood plain regulations. Domestic water supply for these areas is possible, if the land is sold for residential development. There is an expanding need for residential land in the Missoula area.

Three landfills are located within the assessment area (Area C). The Champion International, Inc., ash landfill is located on the leading edge of the area with arsenic concentrations in groundwater exceeding 0.01 mg/l, and the Upland Disposal Site and Disposal Site #1 are located in the southern portion of the assessment area. These areas are designed as locations for the impoundment and storage of wastes; thus, future development (e.g., residential use) is not reasonably anticipated and will need to be restricted to prevent damage to caps. Therefore, no current or future water needs are projected for this area.



Area	Land Use Designation	Potential Residential Use	Current Water Source	Potential Domestic Water Needs	Comments
A	Open/Undeveloped (100 Year Floodway)	NO	N.A.	NONE	Land use restricted
B	Highway/Railroad Right-of-Way	NO	N.A.	NONE	The railroad and interstate rights-of-way are inappropriate for development or land use requiring domestic wells
C	Landfill Area	NO	N.A.	NONE	The Champion ash landfill and the Upland Disposal Site are inappropriate for development and residential use
D	Open/Undeveloped (Land without Access or Industrial Land)	NO	N.A.	NONE	These poorly accessible areas are located adjacent to interstate and railroad rights-of-way and would not be development candidates
E	Residential Area–Milltown Water Users Association (MWUA)	YES	MWUA	YES	This area is currently supplied by an alternate water supply, provided for Milltown residents whose wells were previously impacted
F	Undeveloped Land "Remainder D"	YES	N.A.	YES	Funds have been provided to meet future water demands for this area through connection to the current MWUA alternate water supply
G	NorthWestern Corporation Land/Recreational Use	NO	N.A.	NONE	This area is owned by NorthWestern Corporation and is reserved for recreational use
H		YES	Private Non-Impacted Well	YES	
I	Commercial Use (Gasoline Station-Truck Stop)	NO	Private Non-Impacted Well	YES	A safe water supply has been developed for this property
J	Residential	YES	Private Non-Impacted Wells	YES	These properties currently have a private non-impacted water supply
K	MWUA Expansion Area	YES	MWUA	YES	The commercial and recreational properties are proposed for inclusion in an expanded MWUA service area

Legend

- Domestic Well
- Monitoring Well
- As <= 0.01 mg/L
- As > 0.01 mg/l
- Community Water Supply Well
- Land Use and Future Water Needs Assessment Area Boundary
- 0.01 mg/L Arsenic Plume Boundary
- **0.020** As Concentration (mg/L) 2000-2001 Survey
- 0.020 As Concentration (mg/L) 1992 Survey
- *0.020* As Concentration (mg/L) 1991 Survey
- ND Not detected

Notes:

1. 2000-2001 Survey data was obtained from Land & Water Consulting, Inc. March 2001, December 2000 Groundwater Monitoring Event Data Summary Report.
2. For those wells not surveyed in 2000-2001, 1991-1992 data is presented from Final Draft Remedial Investigation Report – Milltown Reservoir Operable Unit, prepared for ARCO
3. Samples taken from different depths within a nested well are denoted by letter (i.e. 106 A, B, & C)

EXHIBIT 2-16
Land Use, Arsenic Plume, and Future Water Needs Analysis Area

prepared for

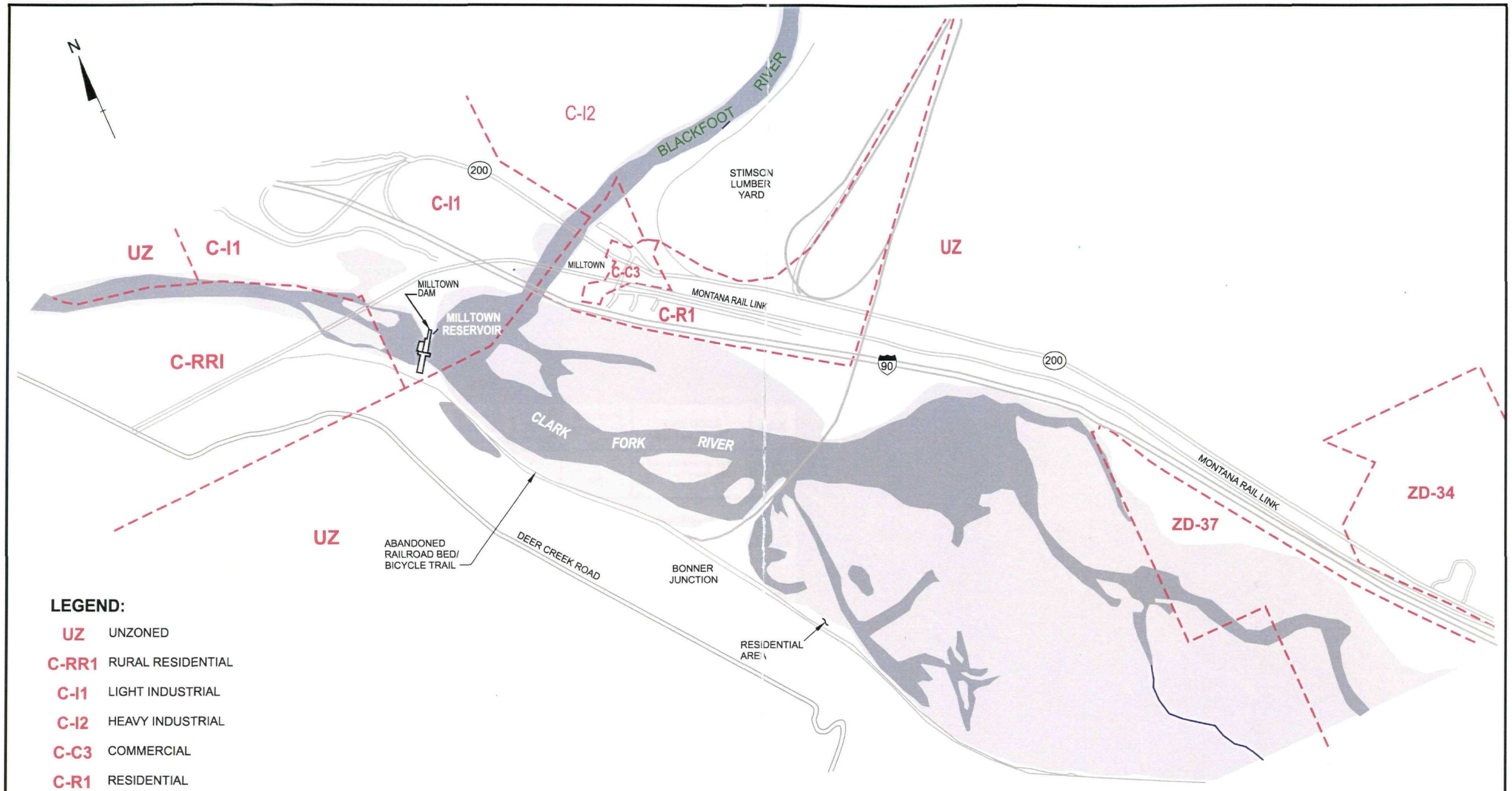
ARCO
ANACONDA MONTANA

N

Scale
500 0 500 1000 feet

Date: 07/26/02

Map Number: CFS1-7B



LEGEND:

UZ	UNZONED
C-RR1	RURAL RESIDENTIAL
C-I1	LIGHT INDUSTRIAL
C-I2	HEAVY INDUSTRIAL
C-C3	COMMERCIAL
C-R1	RESIDENTIAL
ZD-34	ZONING DISTRICT 34 (RESIDENTIAL WITH COVENANTS)
ZD-37	ZONING DISTRICT 37 (RESIDENTIAL WITH COVENANTS)
	APPROXIMATE LOCATION OF DESIGNATED 100-YEAR FLOODWAY (LAND USE RESTRICTED)

NOTE:

1. THIS DRAWING IS NOT TO SCALE.

EXHIBIT 2-17
100-Year Floodway and Missoula County Zoning Map

prepared for
ARCO
ANACONDA, MONTANA

No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
△	10-15-01	Issued for Combined FS	J.F.J	D.G.B	D.G.B

REFERENCE:
BASE MAP OBTAINED FROM FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) MAPS, 1988 WITH ZONING BOUNDARIES DEFINED BY MISSOULA COUNTY PLANNING DEPARTMENT. EDITS INCORPORATED AS DIRECTED BY EPA'S JANUARY 9, 1995 CORRESPONDENCE.

DATE: 10-15-01		DRAWING NUMBER
SCALE:		CFS1-8.dwg

A small undeveloped parcel of land located at, or just downgradient from, the leading edge of the 0.01 mg/l plume is delineated as Area H. This parcel is near the Champion landfill, and is presently developed as a trailer court with about 20 residential units. A community well was recently installed on the property. This well will be monitored on a regular basis in the future. Should arsenic be detected in concentrations above drinking water standards, a replacement water supply may be required.

The Town Pump, Inc., which purchased the former Stimson Lumber Company timber office property located just north of I-90, has developed a gas station and truck stop on the land. Based on monitoring results, the groundwater well providing drinking water to this development is not impacted by the reservoir arsenic plume. Therefore, it is assumed the future water needs for this area will continue to be met through use of the existing well. However, expansion or further development of this area could lead to onsite groundwater use, which could impact the plume.

The interstate and railroad right-of-ways, identified as Area B, are unavailable for residential development. Two areas designated as Area D are located adjacent to right-of-ways and floodways and are not accessible from a public road.

Within the assessment area, three areas have been positively identified that may have future water needs. These three areas include the Montana Water Users Association (MWUA) area, "Remainder D," and the Town Pump, Inc., area. Of these areas, the 35 Milltown homeowners and one commercial establishment have been provided a replacement water supply system. The MWUA water system can be expanded under current funding to encompass the adjacent land of "Remainder D." However, the continued maintenance or expansion of this system relies on voluntary efforts by the homeowners and commercial establishment, and no ICs are currently in place. The county opposes ICs and wants the aquifer returned to its beneficial use. As noted previously, the Town Pump, Inc., area has a drinking water supply well that meets current needs. It is unknown whether increased development pressure will lead to the need for additional onsite groundwater use in this area. The undeveloped land in and around the Champion Landfill is unlikely to be developed in a fashion that would require domestic use of onsite groundwater, but this is not guaranteed.

Considerable uncertainties are associated with permanent ICs in these areas. Groundwater monitoring of the lateral and vertical extent of arsenic contamination, and stability of the area with arsenic concentrations in the groundwater exceeding 0.01 mg/l at the MRSOU, is ongoing and will continue as part of the remedy. The monitoring plan is flexible and may be modified as necessary to change the number of wells, the location of wells, and frequency of sampling in response to the monitoring results. The monitoring plan currently includes approximately 59 wells, sampled semi-annually, and is overseen by EPA and DEQ.

This potential land use description applies only to those areas presently impacted by the arsenic plume. The current arsenic plume boundary seems to be relatively stable; however, routine monitoring has occurred only over the last few years. Long-term monitoring will indicate whether or not the plume is stable under current conditions. If the plume boundary were to expand by as little as 1,000 feet, the additional areas of Milltown (about 50 lots) would also have to be placed on a replacement water supply.

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7 Summary of Site Risks

Baseline risk assessments were completed in the early 1990s for the Milltown site and consisted of the following:

1) Human health risks associated with contaminated reservoir sediments and soils, reservoir biota, and the groundwater plume (EPA 1993b).
2) Ecological risks associated with exposure to contaminants in the river sediments, reservoir biota, and surface water (EPA 1993a).
3) Human health and ecological risks downstream of the reservoir associated with catastrophic releases of sediments from the reservoir (EPA 1993c).

Subsequent agency concerns about fisheries and aquatic life as a result of the February 1996 reservoir ice jam incident resulted in the collection of additional biological, toxicological, and water quality data. EPA then conducted additional ecological evaluations of aquatic risk downstream of the reservoir. This *Ecological Baseline Risk Assessment Addendum* was completed in 2000 (EPA 2000). Human health and ecological risks are described in Sections 7.1 and 7.2, respectively.

7.1 Human Health Risks

Historically, the water in the community of Milltown was supplied by individual wells. In 1981, Missoula City/County Health Department (MCCHD) determined that four potable water wells contained water with arsenic concentrations ranging from 0.22 to 0.51 mg/l. At the time, the Federal drinking water standard for arsenic was 0.05 mg/l; it is now 0.01 mg/l. A series of investigations were undertaken and it was determined that the reservoir sediments were the source of this problem. Based on these findings, the Milltown community replacement water supply system was constructed in 1984. The system and users are described in Section 6, *Current and Potential Future Land and Water Uses*.

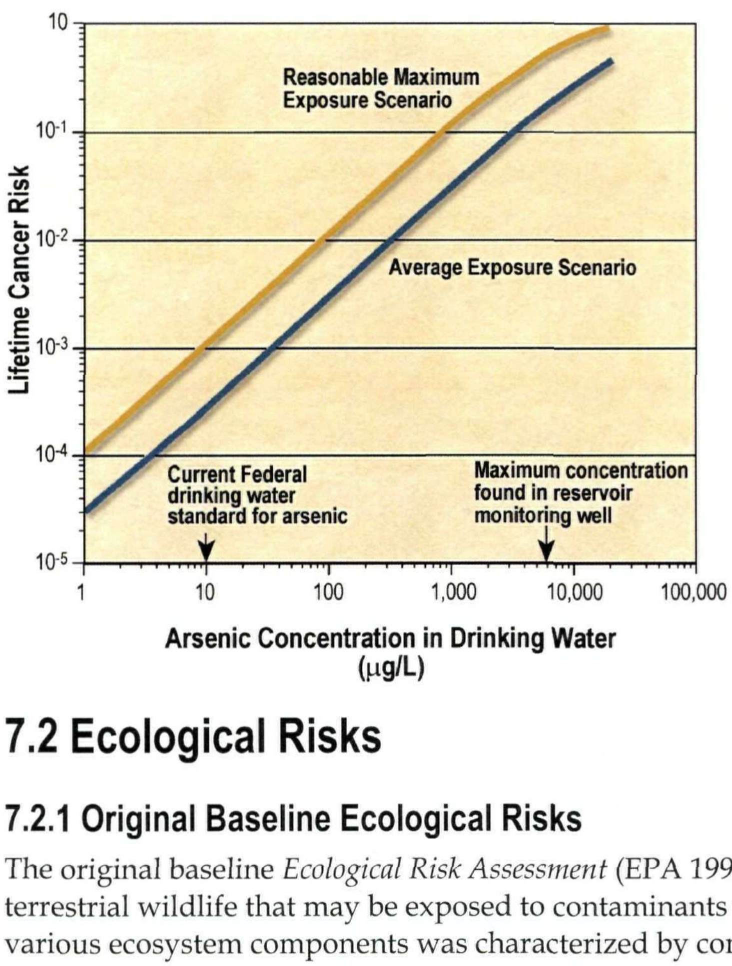
The Baseline *Human Health Risk Assessment* for the MRSOU (EPA 1993b) was prepared to assess potential risks at the site using standard EPA health risk assessment methods for residential and recreational uses. Local residents, the EPA, the State of Montana, Atlantic Richfield Company, and the MCCHD also performed surveys and supplied information on potential exposure behaviors. Where information was still incomplete after these efforts, conservative assumptions were made to quantify potential exposures so that risks to public health would not be underestimated. Components of the risk assessment included the following:

- Exposure Assessment—Calculated a daily dose of arsenic and cadmium, per body weight, as a result of exposure to impacted soils, sediments, surface water, drinking water, game, and edible plants. Doses were calculated independently for each route of exposure and each population at risk, under average and reasonable maximum exposure for current and future land-use conditions.

- Toxicity Assessment—Examined the potential for each contaminant to cause adverse effects and provided an estimate of the dose-response relationship between the extent of exposure to a particular constituent and adverse effects including non-carcinogenic and carcinogenic outcomes.
- Risk Characterization—Chemical exposure estimates were combined with toxicity reference values (TRVs) to develop quantitative cancer and non-cancer health risk estimates for exposure to contaminants associated with the MRSOU. In the risk characterization, chemical exposure estimates were combined with TRVs to develop quantitative cancer and non-cancer risk estimates.

Non-carcinogenic and carcinogenic risks within the MRSOU were estimated to be highest for ingesting impacted groundwater. These risks were found to be unacceptable. Cancer risks associated with drinking impacted groundwater with arsenic concentrations exceeding 0.010 mg/l could exceed 1 chance in 1,000 (a 10^{-3} risk), as shown on Exhibit 2-18, *Cancer Risk from Arsenic.*

EXHIBIT 2-18
Cancer Risk from Arsenic



Other exposure pathways for humans are not significant. This included residential use for existing homes near the reservoir and recreational use of the land surrounding the reservoir. If residential use of land immediately surrounding the reservoir occurred, it would be unacceptable, but this use is not considered likely. The analysis of a potential detoxification threshold for ingestion of arsenic suggested that long-term exposures at the site, other than through consumption of impacted groundwater, would not be associated with a greatly increased non-cancer and cancer risk.

7.2 Ecological Risks

7.2.1 Original Baseline Ecological Risks

The original baseline *Ecological Risk Assessment* (EPA 1993a) addressed risks to aquatic and terrestrial wildlife that may be exposed to contaminants within Milltown Reservoir. Risk to various ecosystem components was characterized by combining results from an exposure assessment with chemical-specific toxicity information. The exposure assessment identifies the various potential receptor populations exposed to contaminants in, or those mobilized from, the reservoir itself. The exposure assessment determines the routes, magnitudes, frequencies, and durations of exposure to the various contaminants. An ecological assessment was then performed to determine whether the impacts predicted by the exposure and toxicity assessments were observable on the site.

The results of these original studies indicated that minimal risk to the environment was found as a result of the existing levels of metals and arsenic contamination found in the reservoir sediments, and no acute risks were identified. The terrestrial and wetland wildlife are diverse and appear to be healthy. The ecological studies of site-wide terrestrial habitats indicated "a lack of observable impacts to terrestrial or aquatic communities, including vegetation, small mammals, muskrats and beaver, waterfowl, songbirds, and deer" (EPA 1993a). Visual observations indicated good species abundance of aquatic plants, amphibians, and healthy and diverse wetland habitats.

7.2.2 Continuing Releases Risk Assessment

The evaluations that were completed as part of the *Continuing Releases Risk Assessment* (EPA 1993c) found that concentrations of arsenic and metals in downstream surface waters and sediments were lower than typical concentrations found in the reservoir. Based on standards in place in 1993, the report found human health risks from exposures to expected concentrations of arsenic in downstream surface waters and sediments were estimated to be low. Under the current standards and current conditions, some violations of current standards are occurring. Also downstream, no risks to terrestrial receptors were predicted.

However, the risk assessment evaluated the additional risk that could be posed by future releases from the MRSOU and concluded that catastrophic failure of the dam would pose a significant risk to downstream aquatic life. Catastrophic failure would also present risks to human health and violations of current standards.

7.2.3 Addendum to Baseline Ecological Risk Assessment

Because of the potential adverse ecological effects downstream as a direct result of the February 1996 reservoir lowering/ice scour event and the corresponding increases of contaminant levels, an addendum to the earlier *Ecological Risk Assessment* was completed in April 2000 (EPA 2000). Supplemental data to the *Remedial Investigation* were also used where appropriate, including information and conclusions reached from the *Clark Fork River OU Ecological Risk Assessment* (EPA 1999).

Unacceptable risks to trout and benthic macroinvertebrates from the release or potential release of copper and zinc were estimated using multiple lines of evidence:

- Use of Hazard Quotients and Hazard Indices based on comparisons of metals in water and site specific TRVs for trout and FAWQCs for dissolved metals.
- Trout population estimates and experiments conducted by FWP that included caged fish studies conducted downstream of Milltown Reservoir, upstream of the reservoir on the two tributaries to the reservoir, and another reference stream location.
- Annual monitoring of benthic macroinvertebrate populations.
- Annual monitoring of periphyton.

Conclusions reached from this *Ecological Risk Addendum* are as follows:

- Water quality downstream, impacted by events such as the February 1996 ice scour, exceeded FAWQCs, and copper may cause a moderate acute risk to aquatic life. Such events may impact trout populations below the dam and are considered by EPA to be unacceptable. Fish population studies conducted by FWP indicated that adult rainbow and brown trout populations below the dam were reduced by 62 percent and 56 percent, respectively, between the summer of 1995 and 1996. Juvenile trout populations dropped 71 percent to 86 percent. Bull trout populations below the dam were expected to be impacted similarly because of the similar tolerance to metals. However, the number of bull trout below the dam were not high enough to make an estimate.
- Normal high flow events may pose an intermittent low level chronic risk to fish because of the combined impacts of copper and other metals in the water column and copper in ingested macroinvertebrates. EPA Region 8 has determined this risk is unacceptable.
- Montana State standards for total recoverable metals were frequently exceeded, during high flow and ice scour events.
- Arsenic and cadmium in surface water may pose low risks and risks from lead and zinc are low during high flow or ice scour events.
- There were no significant risks from exposure of benthic macroinvertebrates to metals in sediment downstream of Milltown Dam during such events, except as described in Section 5.6.2, *Fisheries and Macroinvertebrate.*

7.3 Threatened and Endangered Species

Federally listed species occurring in Montana are listed on Exhibit 2-19. Two of these species (bull trout, bald eagle) occur consistently within the MRSOU. EPA has prepared a Biological Assessment and an addendum of the effects of the selected remedy on the bull trout and the bald eagle (CH2M HILL 2004a, 2004b). USFWS, after review of EPA's Biological Assessment, prepared a Biological Opinion (2004).

Bull trout are listed as threatened under the ESA. This species raises the greatest concern for the USFWS. Risks to trout were calculated using rainbow trout as an indicator species. There is evidence that bull trout have similar sensitivity to metals as rainbow trout. Evidence also indicates bull trout are more sensitive to other stressors, such as water temperature and suspended sediments, than other trout species, particularly brown trout. The presence of the bull trout, and the low numbers of bull trout found in the reservoir and upper Clark Fork River, present a special duty for EPA to ensure the protectiveness and careful execution of the remedy here (see EPA's *Ecological Risk Assessment and Risk Management Principles for Superfund Sites*, page 3, 1999).


Bull Trout

EXHIBIT 2-19
Threatened and Endangered Species in Montana

Common Name	Scientific Name	Status	Range in Montana
Black-footed Ferret	*Mustela nigripes*	E	Prairie dog complexes; eastern
Gray Wolf	*Canis lupus*	E	Forests; western
Grizzly Bear	*Ursus arctos horribilis*	T	Alpine/subalpine coniferous forest; western
Bald Eagle	*Haliaeetus leucocephalus*	T	Forested riparian; statewide
Whooping Crane	*Grus americana*	E	Wetlands; migrant statewide
Piping Plover	*Charadrius melodus*	T	Missouri River sandbars, alkaline beaches; northeastern
Least Tern	*Sterna antillarum*	E	Yellowstone, Missouri River sandbars, beaches; eastern
Pallid Sturgeon	*Scaphirhynchus albus*	E	Bottom dwelling; Missouri, Yellowstone Rivers
White Sturgeon	*Acipenser transmontanus*	E	Bottom dwelling; Kootenai River
Bull Trout	*Salvelinus confluentus*	T	West MT in cold water river, lakes
Water Howellia	*Howellia aquatilis*	T	Wetlands; Swan Valley, northwestern
Ute Ladies'-tresses	*Spiranthes diluvialis*	T	Wet meadow; Jefferson County
Canada Lynx	*Felis lynx canadensis*	T	Forested areas; western

E = Endangered, any species that is in danger of extinction throughout all or a significant portion of its range.
T = Threatened, any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
Source: Smith et al. 1998, modified

7.4 Basis for Response Action

Based on the entire administrative record, including the *Human Health Risk Assessment* and the *Ecological Risk Assessment* and *Addendum*, EPA's conclusion is that unacceptable human health and aquatic risk exists at the MRSOU. EPA, in consultation with DEQ, has determined the response action selected in this *Record of Decision* is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

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8 Remedial Action Objectives

8.1 Basis and Rationale for RAOs

EPA, in consultation with DEQ, met on numerous occasions throughout the RI/FS and *Proposed Plan* processes with local governments, residents, and other interested parties to listen to their concerns and suggestions relative to cleanup goals and objectives for the MRSOU. Their input has been captured in the development of these remedial action objectives (RAOs) presented in this section. The *Baseline Human Health Risk Assessment* (EPA 1993b), the *Baseline Ecological Risk Assessment* (EPA 1993a), and the *Milltown Ecological Risk Assessment Addendum* (EPA 2000b), and EPA's Applicable or Relevant and Appropriate Requirements (ARAR) analysis, provide numeric goals for the protection of human health and the environment; the relevant values are provided in this section. The RAOs were prepared in accordance with 40 CFR Section 300.430(e)(2)(I) of the National Contingency Plan (NCP) and are placed in the administrative record.

The RAOs are media-specific objectives for protecting human health and the environment. They address various chemicals of concern, media of concern, exposure pathways and receptors, current and likely future land and groundwater uses, and remediation goals.

The primary objectives are to protect human health and the environment, and to attain compliance with applicable or relevant and appropriate Federal and State standards, criteria, and requirements, unless a waiver is justified. Examples of practical application of these objectives include the following:

- Restore the groundwater to its beneficial use within a reasonable time period using monitored natural recovery.
- Protect downstream fish and macroinvertebrate populations from releases of contaminated reservoir sediments, which occur with ice scour and high flow events.
- Provide permanent protection against dam failure and the subsequent catastrophic release of contaminated sediments.
- Provide compliance with ESA and wetland protection through consultation with USFWS, the CSKT, and the relevant State agencies.

8.2 Specific RAOs

RAOs developed for each of the contaminated media in the MRSOU are listed below.

8.3 Groundwater

8.3.1 RAOs Overview

For groundwater, the main RAOs are as follows:

- Return contaminated groundwater to its beneficial use within a reasonable timeframe, and prevent ingestion until drinking water standards are achieved.
- Comply with State groundwater standards, including nondegradation standards.
- Prevent groundwater discharge containing arsenic and metals that would degrade surface waters.

The NCP [40 CFR § 300.430(e)(2)(i)(B) and (C)] specifies the Federal Safe Drinking Water Act (SDWA) primary Maximum Contamination Levels (MCLs) and nonzero Maximum Contaminant Levels Goals (MCLGs), and State groundwater standards as ARARs for arsenic present in the groundwater at Milltown. The current Federal standard for arsenic is 10 micrograms per liter (μg/l) and the current State groundwater standard is 20 μg/l (Exhibit 2-20, *Groundwater RGs for Human Health*).

EXHIBIT 2-20
Groundwater Remedial Goals/Performance Standards for Human Health

Chemical	MCLG*	MCL*	Montana Numeric Water Quality Standards*
Arsenic	—	10	20
Cadmium	5	5	5
Copper	1,300	1,300	1,300
Lead	0	15	15
Mercury	2	2	2
Zinc	N/A	N/A	2,000

*Dissolved concentrations in micrograms per liter (μg/l)
Source: Circular WQB-7, Montana Numeric Water Quality Standards, January 2004; Safe Drinking Water Act regulations as noted in the ARARs appendix (Appendix A)

8.4 Surface Water

8.4.1 RAOs Overview

For surface water, the main RAOs are as follows:

- Achieve compliance with surface water standards, unless a waiver is justified.
- Prevent ingestion of or direct contact with water posing an unacceptable human health risk.
- Achieve acute and chronic FAWQC.

The Clark Fork River at Milltown carries a State water quality classification of B-1. Surface water quality will be maintained to support these uses defined as follows (ARM § 17.30.607): "Waters classified B-1 are suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply."

The SDWA establishes MCLs and MCLGs for drinking water sources. The appropriate SDWA standards (dissolved) for contaminants of concern for surface waters at Milltown are shown below:

- Arsenic 0.01 mg/l
- Cadmium 0.005 mg/l
- Copper 1.3 mg/l
- Lead 0.015 mg/l
- Zinc 2.0 mg/l

In addition, EPA has determined that Federal AWQC (dissolved) are appropriate. Through administrative rule making, DEQ has adopted the Montana Numerical Water Quality Standards Circular WQB-7 which are also applicable standards. Water quality standards for surface water are designated as the more restrictive of either the Aquatic Life Standard or the Human Health Standard. The surface water RGs are shown in Exhibit 2-21, *Surface Water Remedial Goals for Ecological Health*, and Exhibit 2-22. The current and more restrictive standards for contaminants of concern are listed on Exhibit 2-22, *Montana Numerical Water Quality Standards Circular WQB-7 (Total Recoverable Basis).*

EXHIBIT 2-21
Surface Water Remedial Goals for Ecological Health (measured as dissolved concentrations)

	Acute AWQC		Chronic AWQC	
	Hardness		Hardness	
Dissolved Metals (µg/l)	**100**	**200**	**100**	**200**
Arsenic	339.8	339.8	147.9	147.9
Cadmium	2.0	4.3	0.27	0.45
Copper	13	26	9.0	16
Lead	81	197	3.0	7.6
Zinc	119	215	119	215

Source: Ecological Risk Assessment Clark Fork Operable Unit, EPA 1999 Federal Ambient Water Quality Criteria (Gold Book 2002)

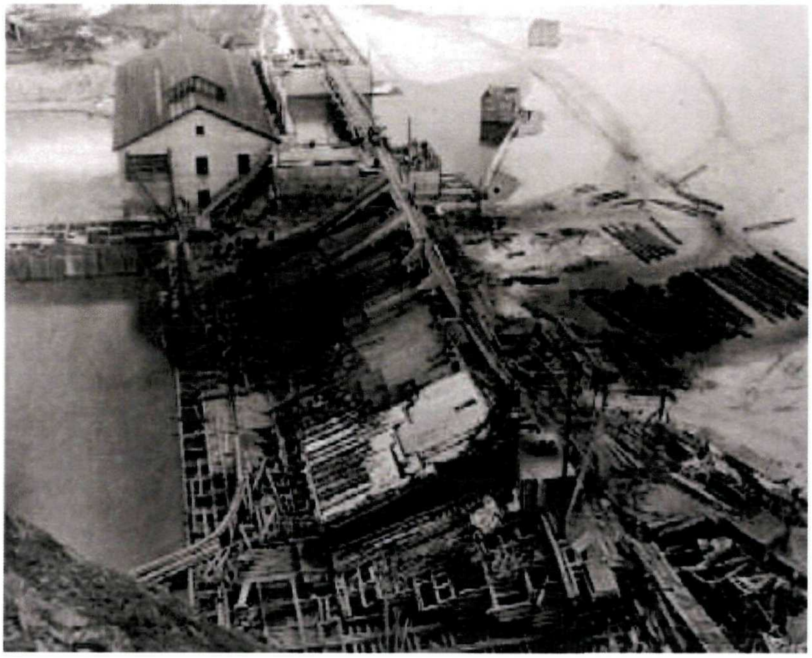
EXHIBIT 2-22
Montana Numeric Water Quality Standards Circular WQB-7 (Total Recoverable Basis)

	Acute	Chronic	Health
Arsenic	340 µg/l	150 µg/l	18 µg/l
Cadmium	2 µg/l*	0.3 µg/l*	5 µg/l
Copper	13 µg/l*	9.3 µg/l*	1,000 µg/l
Lead	82 µg/l*	3.2 µg/l*	15 µg/l
Zinc	119 µg/l*	119 µg/l*	2,000 µg/l

*Assumes at 100 mg/l hardness; standard is based on actual measured hardness at time of sampling.

In summary, the goals for the remedial actions should achieve the following:

- **Groundwater**
  - Restore the alluvial aquifer to its beneficial use as a drinking water supply by attaining the 10 μg/l dissolved arsenic performance standard. This will best be achieved by preventing the further discharge of arsenic from the reservoir sediments into the alluvial aquifer. This will allow the aquifer to restore itself through natural recovery.
- **Surface Water**
  - Attain protectiveness of fish and other aquatic species by consistently meeting State WQB-7 standards and Federal AWQC (Gold Book 2002) downstream of the reservoir.
  - Attain protectiveness of aquatic life by improving water quality downstream of the reservoir through a reduction in sediment and dissolved copper concentrations to consistently achieve values less than or equal to values presented in Exhibit 2-21.
  - Attain protectiveness of threatened and endangered species (bull trout) through application of the remedy in consultation with the USFWS.



Reconstruction of Milltown Dam following 1908 flood

9 Description of Alternatives

9.1 Background and Remedy Components for Each Alternative

Three major *Feasibility Studies* during the past 8 years evaluated various cleanup options:

- **Original Draft *Feasibility Study* (1996)** – Evaluated cleanup alternatives for the groundwater plume contamination to address identified human health risks. A total of 23 alternatives were considered and 8 alternatives were evaluated in detail. Evaluation of remedial alternatives followed EPA guidance and included the following: 1) Protection of human health and the environment, 2) Compliance with ARARs, 3) Long Term Effectiveness and Permanence, 4) Reduction of Toxicity, Mobility and Volume through Treatment, 5) Short Term Effectiveness, 6) Implementability, and 7) Cost. The *Feasibility Study* and *Record of Decision* were not completed at that time because of the occurrence of the ice scour event of February 1996 and resulting surface water quality impacts. A supplemental *Focused Feasibility Study* was determined to be necessary.

- ***Focused Feasibility Study* (2001)** – Evaluated the cleanup alternatives proposed to mitigate the potential risks to downstream aquatic life resulting from ice and flood sediment scouring. A total of 10 alternatives formulated to mitigate surface water impacts were evaluated in detail following standard EPA guidance. In addition, all FERC required dam upgrades and fish passage for any alternatives involving retaining the dam were considered.

- ***Combined Feasibility Study* (2002)** – The *Combined Feasibility Study* incorporated the most effective groundwater cleanup components from the original 1996 *Feasibility Study* with the alternatives proposed for controlling ice and sediment scour identified in the 2001 *Focused Feasibility Study*. Eleven final alternatives were evaluated in detail following EPA guidance and are summarized in Exhibit 2-23, *Cleanup Options Considered in the Combined Feasibility Study*. The alternatives encompassed various remedial actions for the dam, reservoir sediments and channel, and the groundwater plume. The common elements and distinguishing features among the alternatives are identified and discussed in the *Combined Feasibility Study*. The cost breakdown for each alternative (also prepared in 2002) is provided at the end of Section 9.2 in Exhibit 2-24, *Remedial Alternatives Present Value and Total Cost Summary Table*. The cost for the Selected Remedy is provided in Section 12.9, *Cost Estimate for the Selected Remedy*.

EXHIBIT 2-23
Cleanup Options Considered in the Combined Feasibility Study

Alternative	Action to Dam*	Action to Channel and Flood plain Sediments	Action to Groundwater Plume
1—No Further Action	Dam Safety Upgrade. Add Fish Passage.	None	Maintain Replacement Water Supply
2A—Modification of Dam and Operational Practices plus Groundwater Institutional Controls (GW ICs)	Dam Safety Upgrade. Add Fish Passage. Add Inflatable Rubber Dam (IRD).	None	Maintain Replacement Water Supply. Add Controlled GW Area
2B—Modification of Dam and Operational Practices plus GW ICs and Containment and Natural Attenuation within the Aquifer Plume	Dam Safety Upgrade. Add Fish Passage. Add IRD.	None	Add Slurry Wall, add controlled GW area, maintain replacement water supply
3A—Modification of Dam and Operational Practices with Scour Protection plus GW ICs	Dam Safety Upgrade. Add Fish Passage. Add IRD.	*Channel*: Add Soft Streambank Stabilization *Flood plain*: Add Revegetation	Maintain Replacement Water Supply. Add Controlled GW Area
3B—Modification of Dam and Operational Practices with Periodic Removal and Channelization plus GW ICs and Containment and Natural Attenuation within the Aquifer Plume	Dam Safety Upgrade. Add Fish Passage. Add IRD.	*Channel*: Do Limited Sediment Removal and Channelization with Armoring plus Periodic Sediment Removal	Add Slurry Wall, Maintain Replacement Water Supply. Add Controlled GW Area
5—Dam Removal, Partial Sediment Removal with Channelization and Leachate Collection/Treatment, plus GW ICs and Natural Attenuation within the Aquifer Plume	Dam Removal.	*Channel*: Limited Sediment Removal in Channels. Armor Channels *Flood plain*: None	Add Leachate Collection and Treatment. Maintain Replacement Water Supply. Add Controlled GW Area
6A—Modification of Dam and Operational Practices with Initial Total Sediment Removal of the Lower Reservoir and Periodic Sediment Removal Thereafter, plus GW ICs and Natural Attenuation in the Aquifer Plume	Dam Safety Upgrade. Add Fish Passage. Add IRD.	*Channel*: Removal *Flood plain*: Total Sediment Removal below Duck Bridge	Source Removal. Maintain Replacement Water Supply. Add Controlled GW Area. Natural GW Quality Improvement
6B—Modification of Dam and Operational Practices with Total Sediment Removal of the Entire Reservoir plus GW ICs and Natural Attenuation within the Aquifer Plume	Dam Safety Upgrade. Add Fish Passage. Add IRD.	*Channel*: Total Sediment Removal of Lower Reservoir *Flood plain*: Total Removal below Duck Bridge	*Same as 6A, above*
7A1—Dam Removal with Total Sediment Removal of the Lower Reservoir plus GW ICs and Natural Attenuation within the Aquifer Plume	Dam Removal.	*Same as 6B, above*	*Same as 6A, above*

EXHIBIT 2-23
Cleanup Options Considered in the Combined Feasibility Study

Alternative	Action to Dam*	Action to Channel and Flood plain Sediments	Action to Groundwater Plume
7A2—Dam Removal with Partial Sediment Removal of the Lower Reservoir plus GW ICs and Natural Attenuation within the Aquifer Plume	Dam Removal.	*Channel*: Total Sediment Removal of Lower Reservoir *Flood plain*: Total Removal of Area 1	*Same as 6A, above*
7B—Dam Removal with Total Sediment Removal of the Entire Reservoir plus GW ICs and Natural Attenuation within the Aquifer Plume	Dam Removal.	*Channel*: Sediment Removal from Entire Reservoir/Channel Reconstruction *Flood plain*: Sediment Removal	*Same as 6A, above*

*Dam modifications: upgrading the dam to withstand the probable maximum flow; installing fish ladders; and installing an inflatable rubber dam to replace the existing stanchion/flashboard assembly. It should be noted that all upgrades of the dam for safety reasons or fish passage are dictated under FERC's authority, not Superfund authority. These items (i.e., upgrades, fish passage) have been included in the FS for cost comparison only.

9.2 Combined FS Alternatives Descriptions

9.2.1 Alternative 1—No Further Action

The No Further Action Alternative involves no further engineering options, ICs, or other new measures at the MRSOU beyond those currently in place. This alternative relies on the environment and existing actions and controls to maintain or reduce metal concentrations through physical and chemical processes.

The No Further Action Alternative includes previous remedial activities completed at Milltown Reservoir/Clark Fork River Superfund Site, including existing ICs and completed remedial actions, such as the MWUA replacement water supply. Long-term ground and surface water monitoring is also included in the No Further Action Alternative. Since implementation, these actions have provided protection against an unacceptable human health risk from ingestion from the plume of the arsenic contaminated groundwater.

The No Further Action Alternative also presumes that the Milltown Dam will continue to be regulated under the FERC License (Project No. 2543). NorthWestern Corporation or its successor, as the FERC Licensee and owner of the property, is required to satisfy all current and future obligations of the present license. FERC requirements may include the following:

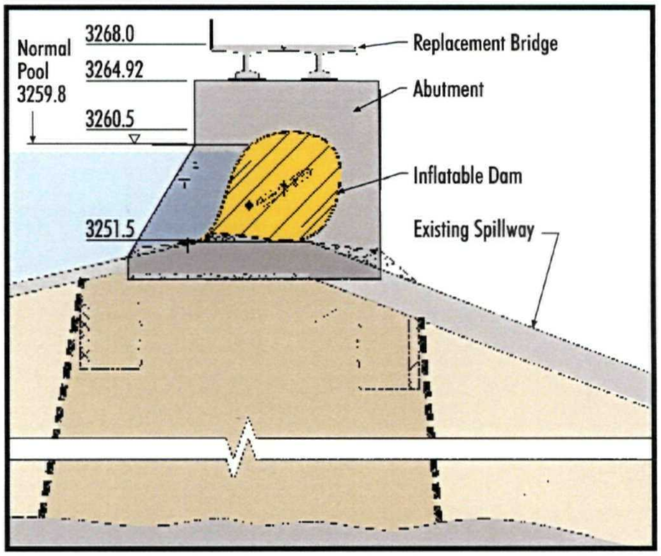
- **Enhanced fish passage around the dam**—Currently, this is being accomplished by FWP and funded by NorthWestern Corporation using a trap-and-haul method. Options for enhancing fish passage, including fish ladders or continued trap-and-haul, are currently being evaluated by FERC. EPA assumes the installation of two fish ladders to permit future fish passage.
- **Dam safety upgrades as necessary to withstand Probable Maximum Flow conditions and Maximum Credible Earthquake as recently mandated for high hazard dams**—

FERC has required NorthWestern Corporation to evaluate various potential upgrades to the dam to withstand probable maximum flow conditions and to further evaluate conditions regarding the maximum credible earthquake. FERC is presently reviewing their findings. EPA has assumed that if the dam remains for this or other alternatives, the dam will be modified to withstand probable maximum flow conditions and other actions as mandated by FERC.

9.2.2 Alternative 2A—Modification of Dam and Operational Practices plus Groundwater Institutional Controls

This alternative involves physical modifications to the dam spillway combined with enhancement of reservoir operational practices designed to mitigate the need to lower reservoir pool level to protect the dam from ice jams and to mitigate the rate or timing of sediment release. Alternative 2A also includes implementation of additional ICs to address potential risks associated with the groundwater arsenic plume. Current practices, described in Alternative 1, would be maintained for this alternative, including FERC's requirements and Milltown's replacement water supply. Dam modifications, as well as new ICs and operational practices, are listed below:

- **Dam Modifications**—Removal of the existing flashboards and replacement with an inflatable rubber dam:
  - *Removal of the Existing Flashboards*—Spillway flow control is currently maintained by a series of 44, 5-foot wide by 8-foot high panels (flashboards). A 43-foot wide by 17-foot high radial gate passes river flows through the dam during all but peak flow periods (when the flashboards are removed to pass the peak runoff). The current flashboard system is cumbersome to operate and precludes passing ice chunks greater than 8 feet across without cutting the stanchions. Removal of these flashboards would mitigate the need for rapid drawdown during an ice jam and lower the operational level of the reservoir by 8 feet. Power generation would still be possible, though less efficient.
  - *Replacement of the Flashboard Assembly with an Inflatable Rubber Dam*—The installation of an inflatable rubber dam to replace the existing stanchion/flashboard would provide improved control of reservoir pool elevation; thus, significantly reducing or eliminating ice scour of reservoir sediments. The overspill characteristic of a rubber dam, and its ability to withstand ice impact, would allow more precise control of water releases during peak flow. This would also eliminate the stanchion/flashboard system.



Section Through Inflatable Rubber Dam

- **Reservoir Operational Practices**—Reservoir operational practices can affect the quality of water released to the Clark Fork River below the dam. Specific operational practices currently in place or that could be implemented include the following:
  - *Full-pool reservoir operation* is the current NorthWestern Corporation operating policy. The reservoir is maintained at approximately 3263.5 feet above mean sea level for the most efficient power generation. Full pool operation also helps to protect existing wetlands. Operating the dam at full pool, while mitigating sediment discharge and minimizing long-term maintenance of dam structures and systems, would be best performed by replacing the stanchion/flashboard system with an inflatable rubber dam.
  - *BMPs for sediment control* include maintaining the highest practical pool elevation to promote maximum sediment settling, thereby conveying the most sediment-free water downstream. Other sediment management practices include avoiding rapid drawdown of the reservoir and allowing for controlled release of fine grained sediment during the declining limb of high flow events, thereby maximizing sediment dilution to flush the reservoir system. BMPs would be compatible with optimum power generation, except for relatively short-lived events where the pool may be drawn down for declining limb sediment release. BMPs for sediment would also favor wetland maintenance and protection.
  - *Implementing additional ICs and additional measures*, such as boating restrictions or overall prohibition of motorized craft in the reservoir, may provide enhanced protection through reduced turbidity. Restrictions could be enforced seasonally or year-round depending on the level of protection desired.
- **Additional Groundwater/Human Health Protection ICs** —Implementation of groundwater institutional controls includes providing continued funding for maintaining the existing replacement water supply; making available contingency funds to reconfigure, expand, or update replacement water supplies; and establishing a controlled groundwater area to ban future wells within or immediately adjacent to the arsenic plume. This alternative relies on the natural attenuating properties of the environment to reduce metal concentrations through physical and chemical processes. Natural arsenic attenuation mechanisms, such as dilution and adsorption, would be expected to continue to limit the extent of the groundwater plume. Several important ICs are already in effect. These include a number of public land use controls such as Missoula County land use plans, flood plain and subdivision regulations, zoning, and county development regulations for service extensions. The Missoula Valley Aquifer Protection Ordinance controls well use in the county. Private land use controls are also in place, such as access restrictions to private property near the reservoir. These existing measures substantially reduce the presence of residences and persons in the area, as well as pressure for development. Additional land use limitations could consist of dedicated land use, local ordinances, deed restrictions, conservation easements, and future agreements with landowners.

9.2.3 Alternative 2B—Modification of Dam and Operational Practices plus Groundwater Institutional Controls and Containment

Alternative 2B combines the dam outflow works and reservoir operational control modifications described in Alternative 2A and the current ICs and additional measures described in Alternative 1 with groundwater containment and ICs:

- **Groundwater Containment**—Groundwater containment would involve the use of physical barriers to restrict the migration of arsenic laden water into the alluvial aquifer beneath Milltown. To be effective, the physical barrier would need to be approximately 5,000 feet long and keyed into the bedrock, which ranges from approximately 45 to 70 feet below ground surface. Barrier effectiveness also depends on keying the west end of the containment wall into the Milltown Dam foundations. Since there may be dam safety and stability issues related to construction of the slurry wall near the dam footings, this option may not be acceptable to dam safety regulatory agencies.
- **Natural Attenuation within Aquifer Plume**—Assuming the groundwater containment measures described above reduced metals and arsenic loading to the alluvial aquifer, it would be expected that metals and arsenic concentrations in the alluvial aquifer would be reduced over time through natural attenuation. By isolating the source sediments from the aquifer, or at least reducing the degree of connection, groundwater containment would reduce the rate of continued metals loading to the aquifer system.

9.2.4 Alternative 3A—Modification of Dam and Operational Practices with Scour Protection plus Groundwater Institutional Controls

Alternative 3A includes the dam modifications and reservoir operational controls identified in Alternative 2A, the current ICs and additional dam safety and fish passage measures described in Alternative 1, and the additional groundwater ICs described in Alternative 2A. In addition, erosion/scour protection and bank stabilization methods are included in this alternative:

- **Riparian Erosion/Scour Protection**—Areas that are inundated while the reservoir is at or near high pool but exposed at low pool would be seeded or sprigged with native vegetation. These areas comprise 61 acres of the lower reservoir area. Non-native plants and grasses with greater erosion resistance properties could be included in the revegetation mix. Areas with higher potential for scour, such as streambanks or areas of concentrated flow, would be stabilized using a higher degree of protection. In some areas, hard stabilization such as riprap or gabions may be required to protect sediment from scour during peak flows.

9.2.5 Alternative 3B—Modification of Dam and Operational Practices with Channelization plus Groundwater Institutional Controls and Containment

Alternative 3B combines the dam outflow works and reservoir operational control modifications described in Alternative 2A, the current ICs and additional measures described in Alternative 1, and the groundwater containment, natural attenuation within the aquifer plume, and the ICs of Alternative 2B with channelization of surface water flow in the lower reservoir. Limited sediment removal upstream of the dam would be performed to construct and maintain Clark Fork and Blackfoot river channels with adequate capacity to convey a design flow for a 100-year storm event. Sediment removal and channelization are described below:

- **Saturated Sediment Removal** — Limited initial sediment removal (approximately 700,000 cubic yards [cy]) would be implemented to construct a channel with adequate capacity to convey a design flow for a 100-year storm event. The flow depth would require construction of 2- to 4-foot high dikes on both of the constructed channels to contain the 100-year flow within the channel. Sediment removal to create the 100-year flow channels would be performed using hydraulic dredging techniques supplemented with clamshell dredging if significant quantities of debris are encountered. Hydraulically dredged materials would be pumped in a slurry to a containment area for wet disposal or for sediment de-watering and subsequent transport to a dry disposal facility. The reservoir would be maintained at full pool levels while dredging occurred in the river channels. Re-entrainment of sediments in the river flows and turbidity concerns during construction would be addressed, to the degree practicable, using engineering controls such as silt curtains. This alternative assumes that sediment may accumulate in the channels after the initial removal requiring additional periodic removals — perhaps as frequently as every 4 years — to maintain sufficient capacity to convey the 100-year flow within the channel. Approximately two construction seasons would be necessary to complete the initial sediment removal and channel reconstruction work for Alternative 3B. Excavated sediments would require dewatering, transportation, and disposal at an off-site repository. Options for dewatering of removed sediments, transportation of sediments, and off-site disposal of sediments are described below:
  - *Sediment Transport* – Three means of transporting excavated sediments to the disposal site were evaluated: slurry pipeline, truck transport, and rail transport. The actual transportation option selected would depend on whether the sediments were to be disposed of in a "wet" or "dry" repository and the distance to potential disposal sites:
    - Potentially the most cost-effective sediment transportation option if removed by dredge is by slurry pipeline. The relatively high up-front capital investment and the need to maintain the pipeline between removal events may not be cost effective for longer distances or for smaller volume removals.
    - Overland transport via truck is another transportation option for sediments after they have been dewatered. It would require at least 35,000 round-trip truck trips with a standard road legal 20-cubic yard capacity truck with trailer, to relocate the dewatered sediments excavated during the initial excavation (assuming a 700,000 cy initial removal). Transport of sediments excavated during the periodic removal via overland truck would require at least 17,500 round-trip truck trips per event (assuming 350,000 cy per maintenance removal event). Rail transport would require approximately 8,430 rail car loads with 83-cubic yard capacity cars to relocate the dewatered sediments initially excavated to the disposal facility (assuming a 700,000 cy initial removal). Transport of sediments excavated during periodic removal via rail would require approximately 4,200 rail car loads

(assuming 350,000 cy per maintenance removal). Rail transport would require construction of loading and unloading spurs and facilities.

- *Sediment Dewatering* – Sediment dewatering could occur onsite with subsequent transport by truck or rail to the disposal site, or at the disposal site after transport using a slurry pipeline. At some dredging sites, sediments have been dewatered using settling ponds with polymers added to the slurry to enhance settling. However, given the limited space available onsite for settling ponds and the relatively fine-grained nature of the Milltown sediments, it is assumed that settling ponds alone would not achieve adequate dewatering in a reasonable time. Effective sediment dewatering would require use of mechanical dewatering, using filter or belt presses, to reduce free water from the sediments prior to truck or rail transportation. Maintenance or periodic re-assembly of the dewatering facility may be required indefinitely since periodic removal of sediments may continue indefinitely. Water collected during either mechanical or passive dewatering will likely require treatment to reduce metals and arsenic concentrations prior to discharge, presumably back to the Clark Fork River.
- *Sediment Disposal* – It is assumed that sediments would be disposed of in a solid waste repository located at a suitable site in Missoula County (or to Opportunity Ponds in Deer Lodge County) in accordance with County, State, and Federal regulations. Operation of the disposal facility may be required indefinitely since periodic removal of sediments may be ongoing. Depending on the disposal option selected, the removed sediments could be mechanically dewatered and transported to the disposal facility for "dry" placement in a non-hazardous repository or the sediments could be transported via a slurry pipeline and placed "wet" in a lined "tailings pond" facility.

- **Channelization** – Channelization of the major river channels directly upgradient of the dam, along the existing Clark Fork and Blackfoot river channel alignments, would be accomplished using engineering controls such as levees, grout-filled mattresses, gabions, rock armor, or sheet piling designed for peak flow. The constructed channel would need to tie into the existing gravel riverbed. Channelization would divert flow that is currently feeding the wetland areas and concentrate flow within a primary channel. Two- to four-foot high armored dikes would need to be constructed on both sides of the Clark Fork and Blackfoot river channels to contain floodwaters during a 100-year flood event. In addition, armored levees would need to be constructed upstream of Duck Bridge to direct floodwaters from the existing braided Clark Fork River channels into the reconstructed channel. These levees would also be sized and armored to prevent overtopping or erosion.

9.2.6 Alternative 5—Dam Removal, Partial Sediment Removal with Channelization and Leachate Collection/Treatment, plus Groundwater Institutional Controls and Natural Attenuation within the Aquifer Plume

Alternative 5 includes the removal of the Milltown Reservoir Dam and a one-time sediment removal to create deeper Clark Fork and Blackfoot river channels upstream of the dam. The upstream channels would be reconstructed and armored to be compatible with the river bottom grade after dam removal and they would be sized for a 100-year storm event. In addition, leachate would be collected and treated from metals-impacted sediments left in place. Groundwater ICs would be similar to Alternative 2A, but tailored to suit this alternative, such as reducing the extent of a controlled groundwater area if leachate collection and natural attenuation were effective in decreasing the extent of the arsenic plume.

- **Sediment Removal, Transportation, Dewatering, and Disposal**—A limited one-time sediment removal (approximately 700,000 cy) would be implemented, using hydraulic cutterhead dredging, to construct a channel with adequate capacity to convey a 100-year design flow. This constructed channel will need to begin upstream of Duck Bridge and tie into the existing gravel riverbed downstream of the dam. Options for removal, transportation, dewatering, disposal, and channelization are described in Alternative 3B. Reach gradient would be increased by removal of Milltown Dam; therefore, flow depths in the reconstructed channels during a 100-year flood event would be less than what would occur under Alternative 3B.

- **Leachate Collection and Treatment**—Leachate collection/treatment involves installing interception trenches (french drains) with pumping wells (sumps) along the perimeter of the reconstructed channel to intercept groundwater percolating through impacted materials prior to discharge to the reconstructed channels. The leachate collection and treatment system would need to operate indefinitely as long as metals release from the left in place impacted sediments presents a loading risk to the Clark Fork River. The treatment system would generate sludge that would require continued disposal in a suitable facility throughout plant operation.

- **Natural Attenuation within Aquifer Plume**—Alternative 5 would be expected to reduce contaminant loading to the alluvial aquifer beneath and downgradient of Milltown through three mechanisms:

  - *Reduction in flux rate of sediment pore water entering the aquifer*—Given their hydraulic connection, the lowering of surface water levels in the reservoir as a result of dam removal would likely result in a similar amount of lowering in lower reservoir sediment water levels. Lower sediment water levels relative to water levels in the underlying aquifer would reduce or potentially reverse the current downward hydraulic gradient from the sediments into the underlying aquifer, which would reduce the flow rate of metals and arsenic impacted sediment pore water entering the aquifer.

  - *Geochemical changes that likely reduce arsenic solubility while increasing copper solubility*—The partial dewatering of the left-in-place sediments would likely reduce the relative amount of sediments exposed to the reducing conditions that geochemically favor release and transport of dissolved arsenic. However, partial sediment dewatering would likely expose additional sediments to oxidizing conditions that favor release of additional dissolved copper.

  - *Leachate collection system pumping*—In addition to preventing sediment leachate from discharging to the Clark Fork and Blackfoot rivers, active pumping of the water from the leachate collection trench system should further reduce the current hydraulic gradient and water flux from the sediments into the aquifer beneath Milltown. Assuming the measures described above reduced loading of at least arsenic to the alluvial aquifer, it would be expected that the natural attenuation processes described in Alternative 2B would further reduce aquifer contaminant concentrations and plume extent over time.

- **Dam Removal**—Dam removal involves decommissioning of the Milltown Dam. The objective of dam removal would be to eliminate the potential for sudden releases of contaminated sediments from the reservoir and to minimize the potential for future accumulation of sediments. Dam removal would be completed after the sediment removal and channelization/drop structure construction work. Removal of the dam would be performed during low flow periods (July to March) to minimize sediment discharge potential. One to two construction seasons are estimated to complete dam removal. The USACE assumed that dam removal would involve the following:
  - Removing the non-overflow section of the dam
  - Installing a cofferdam/culvert system to pass river water around the dam
  - Installing a cofferdam upstream and downstream to allow dry work
  - Removal of the powerhouse and spillway using demolition techniques
  - Removal of the cofferdams and culvert system
  - Site grading, seeding and installation of bank protection
- **Drop Structures**—Drop structures would need to be constructed on the Clark Fork and Blackfoot rivers at the upstream ends of the removed/reconstructed channels to mitigate upstream headcutting associated with removal of the dam and the resultant drop in river base level. A number of different types of drop structures could be used to mitigate the potential for head cutting. Structures that use more natural gradients and vegetative armoring are available, and would provide a more natural appearing channel. Concrete structures that do not impede fish passage are less costly.

9.2.7 Alternative 6A—Modification of Dam and Operational Practices with Initial Total Sediment Removal of the Lower Reservoir and Periodic Sediment Removal Thereafter, plus Groundwater Institutional Controls and Natural Attenuation in the Aquifer Plume

Alternative 6A involves the initial removal and disposal of all of the metals-impacted sediments in the lower reservoir area. Alternative 6A also includes provisions for fish passage, modifications to the dam outflow works, and reservoir operational controls identified in Alternative 2A. This alternative would remove the thickest sediments, containing the highest concentration of metals. If metals-contaminated sediments re-accumulated to a degree that they represented a new risk to ground or surface water, this alternative would include future removals of re-accumulated sediments. A goal of this alternative would be to reduce or eliminate the groundwater arsenic plume by removing the source sediment area and allowing the natural attenuation processes described in Alternative 2B to restore the aquifer over time.

- **Sediment Removal, Transportation, Dewatering, and Disposal**—The initial removal of the lower reservoir sediments would total approximately 5.2 mcy of sediments. It is estimated that 2.6 mcy of sediment could re-accumulate in the reservoir in 20 years, and require subsequent removal. General options for hydraulic removal, transportation, dewatering, water treatment, and disposal, are as described in Alternative 3B. It is estimated that approximately seven construction seasons would be necessary to complete the sediment removal actions for Alternative 6A. The sediment removal area would initially become a "reservoir lake" after the removal because no backfill would be placed to replace the removed sediments. However, over time sediments would gradually re-accumulate in the removed areas as upstream sediments deposit in the slack water. It would take many decades for the reservoir to completely fill in to recreate its current sediment volume and "run of the river" reservoir planform.

9.2.8 Alternative 6B—Modification of Dam and Operational Practices with Total Sediment Removal of the Entire Reservoir plus Groundwater Institutional Controls and Natural Attenuation within the Aquifer Plume

Alternative 6B involves the removal and disposal of sediments of the entire reservoir area as well as provisions for the fish passage, modifications to the dam outflow works, and reservoir operational controls identified in Alternative 2A. This alternative would be designed to remove all of the impacted sediments within the reservoir area. In addition, if metals contaminated sediments re-accumulated to a degree where there was potential risk to ground or surface water, this alternative would include future removals of re-accumulated sediments from the lower reservoir area only. Similar to Alternative 6A, a goal of this alternative would be to reduce or eliminate the groundwater arsenic plume by removing the source sediment area and allowing the natural attenuation processes described in Alternative 2B to restore the aquifer over time. However, it is assumed that the alternative may need to include some of the groundwater ICs described in Alternative 2A at least as a temporary measure during and immediately after construction.

- **Sediment Removal, Transportation, Dewatering and Disposal**—A one-time sediment removal of the entire reservoir (8.9 mcy) would be implemented as described for Alternative 6A. Approximately 12 construction seasons would be needed to complete sediment removal. As with Alternative 6A, the 6B sediment removal area would initially be a reservoir lake that would gradually fill in as upstream sediments deposit. It is assumed that sediments re-accumulating in the upper reservoir would not be removed in a subsequent removal.

9.2.9 Alternative 7A—Dam Removal with Total Sediment Removal of the Lower Reservoir plus Groundwater Institutional Controls and Natural Attenuation within the Aquifer Plume

Alternative 7A is similar to Alternative 6A except that it includes the total decommissioning of the Milltown Dam. In addition, partial backfill would be needed to reconstruct river channels and flood plains for lateral stability and to provide adequate substrate for establishing vegetation. Also, because the dam and reservoir are removed, significant deposition of sediments from upstream would not be expected. A goal of this alternative would be to reduce or eliminate the groundwater arsenic plume by removing the source sediment area and allowing the natural attenuation processes described in Alternative 2B to restore the aquifer over time. However, it is assumed that the alternative may need to include some of the groundwater ICs described in Alternative 2A, at least as a temporary measure during and immediately after construction. Two Alternative 7A removal volume sub-options were developed, including Alternative 7A1, which assumes removal of all the reservoir sediments and reconstruction of natural channels and flood plains over the entire lower reservoir area; and Alternative 7A2, which would leave the sediments located in Area 2 in place and isolate the sediments from the Clark Fork River channel (similar to Alternative 5, but without leachate collection).

- **Sediment Removal, Transportation, Dewatering and Disposal**—Under Alternative 7A1, a one-time sediment removal of the entire lower reservoir (approximately 5.2 mcy) would be implemented as described for Alternative 6A. Options for hydraulic removal, transportation, dewatering, water treatment, and disposal would be as described for Alternative 3B. Disposal volumes, water volumes, options for mechanical removal, water treatment, transportation, and removal timeframes are similar to Alternative 6A. Under Alternative 7A2, sediment removal would be implemented as described for Alternative 7A1, except that the anticipated removal volume would be reduced to approximately 4.2 mcy. It is estimated that reconstructing the flood plain and channels in the Alternative 7A1 removal area consistent with the upstream template would require approximately 0.5 mcy of flood plain backfill, and construction and shaping of approximately 6,700 feet of new channel (5,400 feet of Clark Fork River channel and 1,300 feet of Blackfoot River channel). Required backfill quantities would be reduced to approximately 0.4 mcy. It is assumed that the reconstructed Clark Fork and Blackfoot River stream channels would be approximately 150 feet wide with a typical water depth of approximately 4 feet under average flow conditions. It is assumed that the native alluvium exposed after the removal of the overlying sediments would be acceptable as bed material for the reconstructed channels. Streambanks would be reconstructed at a bankfull height that allows for out of bank flow when flows exceed a 1.5 to 2 year return interval. Bank stabilization of the reconstructed channels would be necessary to maintain geomorphic stability. Stabilization could include softer bioengineering approaches using vegetation, degradable fabrics, and deformable toe protection using smaller-sized rock riprap. To minimize the amount of channel grading and flood plain backfill required, it is assumed that the centerlines of the reconstructed channels would generally follow the line of minimum elevation in the post-removal exposed alluvium surface.
- **Dam Removal**—As in Alternative 5, dam removal involves the partial decommissioning of the Milltown Dam (spillway only). The power house structure would be retained as a historic artifact.
- **Drop Structures**—Drop structures would be required on the Blackfoot and Clark Fork rivers at the upstream end of the lower reservoir removal area to provide a controlled drop in river water levels to mitigate the potential for upstream headcutting.

EXHIBIT 2-24
Remedial Alternatives Present Value (PV) and Total Cost Summary Table*

Remedial Alternative[1]	PV Capital Costs	PV O&M Costs	PV Site Monitoring Costs	PV Periodic Costs	Total Estimated PV Cost	Total Estimated Cost
Alternative 1[2]	$11,998,713	$3,379,859	$2,232,785	$107,903	$17,719,259	$49,795,897
Alternative 2A[2]	$13,891,487	$3,899,285	$2,232,785	$248,516	$20,272,073	$60,547,983
Alternative 2B[2]	$19,810,153	$4,653,961	$2,396,431	$285,916	$27,146,460	$72,942,798
Alternative 3A[2]	$21,951,508	$5,378,252	$2,232,785	$411,870	$29,974,415	$78,696,478
Alternative 3B[2] (to Local Wet Repository w/Slurry Transport)	$63,199,514	$6,760,876	$2,726,375	$27,130,758	$99,817,523	$365,190,244
Alternative 5 (to Local Wet Repository w/Slurry Transport)	$58,629,053	$46,964,409	$2,562,729	$377,653	$108,533,844	$425,043,546
Alternative 6A[2] (to Local Wet Repository w/Slurry Transport)	$108,448,728	$5,598,246	$3,686,007	$13,810,180	$131,543,162	$455,213,643
Alternative 6B[2] (to Local Wet Repository w/Slurry Transport)	$180,247,619	$8,389,764	$4,305,643	$10,184,941	$203,127,966	$634,893,803
Alternative 7A1 (to Local Wet Repository w/Slurry Transport)	$114,354,252	$3,682,404	$3,686,007	$325,906	$122,048,569	$193,481,287
Alternative 7A2 (to Local Wet Repository w/Slurry Transport)	$85,838,831	$3,459,977	$3,532,066	$348,565	$93,179,439	$167,838,112
Alternative 7B (to Local Wet Repository w/Slurry Transport)	$193,413,583	$6,948,819	$4,305,643	$485,342	$205,153,387	$384,597,688

Notes:

[1]Where multiple sediment transport/disposal options exist for a removal alternative, the lowest cost option is used.

[2]The Total Estimated PV Costs and Total Estimated Costs for alternatives that maintain Milltown Dam include Non-Superfund (i.e. FERC-related) Costs of $15,378,572 and $35,687,097, respectively.

* This Exhibit was prepared in August 2002 for the Draft Final Combined Feasibility Study. These costs may be somewhat out of date, but reflect the source of the bulk of the costs for each alternative, such as operations and maintenance. The current cost range for the selected remedy is presented in Section 13.?. Costs had to be revised because the selected remedy incorporates a number of sub options from various alternatives.

9.2.10 Alternative 7B—Dam Removal with Total Sediment Removal of the Entire Reservoir plus Groundwater Institutional Controls and Natural Attenuation within the Aquifer Plume

Alternative 7B is similar to Alternative 6B except it includes the total decommissioning of the Milltown Dam. In addition, partial backfill would be needed to reconstruct river channels and flood plains for lateral stability and provide adequate substrate for establishment of vegetation.

- **Sediment Removal, Transportation, Dewatering and Disposal**—Same as described for Alternative 6B.
- **Flood plain/Channel Reconstruction, Dam Removal and Drop Structures**—Flood plain/channel reconstruction and dam removal are similar to Alternative 7A1. Flood plain backfill volumes, channel/streambank reconstruction lengths and flood plain revegetation acreages would be increased in Alternative 7B to approximately 1.6 mcy, 13,420 feet (12,120 for the Clark Fork River and 1,300 feet for the Blackfoot River), and 508 acres respectively.

9.3 Expected Outcomes of Each Alternative

None of the alternatives, if implemented individually, would completely achieve all the EPA-identified RAOs, particularly meeting WQB-7 surface water quality for copper or groundwater quality for arsenic, because of continued loading from upstream, and residual sediment contamination sources left onsite. Upon implementation, Alternatives 2a through 3b would reduce the potential for sediment scour events by increasing the dam's ability to manage flows and winter ice passage, while adding some erosion resistance to river banks. However, the contaminated sediment source material would continue to contribute dissolved arsenic to the groundwater even if the slurry cutoff wall were successful in preventing arsenic movement to the north. Alternative 5, although eliminating the reservoir pool by dam removal, would not adequately address chronic aquatic and erosional risks of source material that would remain along streambanks and in the active flood plain. Alternatives 6a and 6b enhance flow management by retaining the dam, and engage in various contaminated sediment source removal scenarios, but still retain the potential to impound contaminated soils and sediment eroded from upstream. The variations of Alternative 7, which engage dam removal and sediment source material removal as their remedial cornerstones, come closest to reducing the risks, being protective, and complying with ARARs. Groundwater RAOs would be achieved more quickly under Alternatives 5 and 7, as compared to other alternatives. Alternatives 2, 3, and 6 would potentially take the longest period of time to achieve groundwater RAOs, and may never achieve total compliance.

9.3.1 Alternative 1—No Further Action

Because no further action would be taken under this alternative, the expected outcome would be as follows:

- Contaminated sediments would continue to be eroded from the reservoir during scour conditions and transported downstream. Total and dissolved copper would be liberated to the detriment of downstream aquatic life.
- Elevated groundwater arsenic concentrations would continue for the foreseeable future as reservoir pool water drives arsenic-laden sediment pore water into the local aquifer, sustaining the existing groundwater plume. Impacted areas may improve over time, but many risks and associated affects would continue for many years.
- Human health risks from groundwater consumption would continue. The lack of ICs to prevent groundwater use would not prevent consumption despite the presence of the alternative water supply.
- Ecological impacts would be likely and ARARs would not be achieved.

9.3.2 Alternative 2A—Modification of Dam and Operational Practices plus Groundwater Institutional Controls

The emphasis of this alternative is on reservoir pool level control to protect the dam against future ice jams and to mitigate uncontrolled sediment releases. The anticipated outcomes of this alternative are as follows:

- Installation of an inflatable crest does allow more accurate management of reservoir pool stage, particularly during high flows. However, it does not address erosion of reservoir bed sediment during maintenance related drawdowns and ice scour events, nor would it reduce or eliminate the continual transport of arsenic from reservoir sediments into the local aquifer.
- Aquifer cleanup would be left to natural attenuation and ICs to limit human risk with a cleanup rate of literally decades. The objective of better control over pool elevation management would occur rapidly, but much uncertainty relative to sediment scour (and subsequent downstream impacts to aquatic life) and arsenic contamination of the local aquifer would continue, which would inhibit its beneficial use.
- Continued ecological impacts would be likely. ARARs and replacement standards would not be achieved in a timely manner.

9.3.3 Alternative 2B—Modification of Dam and Operational Practices plus Groundwater Institutional Controls and Containment

Alternative 2B embodies the attributes of 2A and adds a groundwater containment feature to help limit, or at best prevent, the flow of contaminated groundwater into the local valley aquifer. If successful, natural attenuation and dilution would be relied upon to remediate the existing groundwater plume. ICs over groundwater use would still be needed. The anticipated outcome of implementing this alternative would be as follows:

- The continued arsenic and metals loading to the aquifer would be reduced; however, the uncertainties associated with the successful construction and implementation of a slurry cutoff wall are many.
- In spite of construction of a cutoff wall, the source sediment material would remain and the generation of dissolved arsenic and metals in the sediment pore water would continue, with the fate and transport of these contaminants uncertain.
- Other concerns related to sediment scour as described as part of Alternative 2A would apply to this alternative as well. Continued ecological impacts would be likely.
- Groundwater ARARs would not be achieved in a timely manner. Surface water ARARs would be violated periodically.

9.3.4 Alternative 3A—Modification of Dam and Operational Practices with Scour Protection plus Groundwater Institutional Controls

This alternative is identical to 2A with the addition of a riparian erosion/scour protection component. The intent of the riparian erosion/scour protection component is to stabilize and protect an additional 61 acres of exposed sediment that would be susceptible to erosion during high flows. Expected outcomes associated with this alternative include the following:

- Source sediments would remain in-place. The generation of dissolved arsenic and metals from the sediments would continue to migrate into the valley aquifer. Groundwater clean-up would rely on natural attenuation and dilution to mitigate conditions over a long period of time. Groundwater ICs would prevent the use of portions of the valley aquifer as a potable water supply.
- Scouring during extreme events would continue to entrain contaminated sediment and transport it downstream. Downstream aquatic life would remain at risk during these periods.

9.3.5 Alternative 3B—Modification of Dam and Operational Practices with Channelization plus Groundwater Institutional Controls and Containment

Alternative 3B encompasses the attributes of Alternatives 1 and 2 with a channel enhancement (to contain 100 year flow) for both the Clark Fork and Blackfoot rivers near the Milltown Dam. Channelization would entail the removal of 700,000 cy of sediment and its transport to a repository. The outcome of this alternative would be as follows:

- Most of the source sediments would remain to contribute to the degradation of the local aquifer, leaving uncertain natural attenuation and dilution to mitigate the groundwater impacts.
- Some risk associated with mobilizing and transporting contaminated sediment downstream as a result of extreme hydrologic events would remain.
- Over time, upstream sediment would re-accumulate in the excavated channel sections and require periodic removal.

- The pool elevation would be managed more effectively to pass ice flows and debris during high water. However, downstream aquatic life remains at risk.
- New risk associated with the excavation and safe transport/deposition of contaminated sediment becomes a concern with this alternative.

9.3.6 Alternative 5—Dam Removal, Partial Sediment Removal with Channelization and Leachate Collection/Treatment, Plus Groundwater Institutional Controls and Natural Attenuation within the Aquifer Plume.

Partial sediment removal (700,000 cy), channelization with leachate collection and treatment, and dam removal are the primary attributes of Alternative 5. The existing groundwater plume would be remediated through natural attenuation and dilution. The outcome of this alternative would include the following:

- A free flowing river confluence would be created, with a significant volume of contaminated sediments left within the existing channel and 100-year flood plain. This residual material remains susceptible to high flow and ice scouring and remains a threat to the local aquatic system.
- The conditions contributing to the movement of contaminated pore water into the local aquifer are removed and local water tables are expected to adjust by stabilizing at lower levels. In some localized areas, particularly adjacent to the reservoir, groundwater flow direction may be altered as the channel seeks a new equilibrium elevation.
- Groundwater recharge to the Clark Fork River, in the vicinity of the reservoir and through the remaining adjacent sediment, would be intercepted and treated to prevent potentially contaminated pore water from directly entering the river.
- The potential scour of contaminated in-channel and residual flood plain sediment continue to place downstream aquatic life at risk when this sediment is mobilized in large volumes.
- Groundwater ARARs may be met more quickly under this alternative as the reservoir conditions that sustain and feed the arsenic plume are greatly reduced or eliminated.

9.3.7 Alternative 6A—Modification of Dam and Operational Practices with Initial Total Sediment Removal of the Lower Reservoir and Periodic Sediment Removal thereafter, plus Groundwater Institutional Controls and Natural Attenuation in the Aquifer Plume.

Under this alternative, the dam would remain with a new inflatable crest, the groundwater arsenic plume would be managed through ICs with natural attenuation and dilution remediating its impacts, and 5.2 mcy of reservoir sediment would be removed through dredging and transported to a repository. The outcomes associated with this alternative would include the following:

- Significant short term risks associated with implementing this large removal over a multiple construction year schedule (7 years) under uncertain hydrologic conditions.

- Potential for short term exacerbation of the groundwater arsenic plume during the sediment removal through exposure of the sediments and maintenance of constant head conditions.
- Even with the removal of this large volume of sediment, the risk of scour and transport downstream of residual contaminated sediment not being removed would remain.
- This would not be a permanent solution as the area behind the dam would refill with sediment from upstream over time.

9.3.8 Alternative 6B—Modification of Dam and Operational Practices with Total Sediment Removal of the Entire Reservoir, plus Groundwater Institutional Controls and Natural Attenuation in the Aquifer Plume.

This is the total sediment removal alternative and would involve the removal of 8.9 mcy of sediment impounded by the Milltown Dam. The expected outcomes of this alternative include the following:

- Significant short term risks associated with implementing this large removal over a multiple construction year schedule (12 years) under uncertain hydrologic conditions.
- Potential for short term exacerbation of the groundwater arsenic plume during sediment removal through exposure of the sediments and maintenance of constant head conditions.
- Contaminated groundwater would be remediated passively over a decade or so through natural attenuation and dilution. Elimination of the arsenic source for the plume would accelerate this process.
- This alternative does not propose a permanent solution. The area behind the dam would refill with sediment from upstream over time and may eventually require dredging, depending on the contaminant quality of the sediment.
- From a risk reduction/cost ratio, this alternative would not be as cost effective as some of the other alternatives.

9.3.9 Alternative 7A—Dam Removal with Total Sediment Removal of the Lower Reservoir, plus Groundwater Institutional Controls and Natural Attenuation in the Aquifer Plume.

Alternative 7A consists of dam removal and several variations of sediment removal (7A1—total removal of all sediments and reconstruction of a new Clark Fork River channel; and 7A2—isolate and remove Area 1 only (2.6 mcy) and reconstruction of a new Clark Fork River channel). The anticipated outcome of this alternative and sub-options would be as follows:

- For 7A1, significant short term risks associated with implementing this large removal over a multiple construction year schedule (7 years) under uncertain hydrologic conditions. For 7A2, the removal process could be managed into a more compact schedule (5 years) that would reduce the risk for upset resulting from the occurrence of an extreme hydrologic event.

- For 7A1, even with the removal of this large volume of sediment (5.2 mcy), the risk of scour and transport downstream of residual reservoir contaminated sediment not being removed would remain. This remains an issue for 7A2 as well (remove 2.6 mcy), although sediment with the highest copper and arsenic concentrations would be removed.
- Groundwater recovery under 7A1 may be exacerbated if the sediments are removed under full pool prior to removal of the Milltown Dam. Exposure of more sediments during the dredging process under a full pool head may result in more arsenic migrating into the local aquifer. The same outcome is less likely for 7A2, since Area 1 will be isolated and a significant proportion removed mechanically (in the dry) rather than dredged.
- Elimination of the reservoir pool and the significant source sediments should hasten the recovery of the existing arsenic plume under both sub options (from centuries to a decade or so).

9.3.10 Alternative 7B—Dam Removal with Total Sediment Removal of the Entire Reservoir, plus Groundwater Institutional Controls and Natural Attenuation in the Aquifer Plume.

Alternative 7B consists of the removal of all the sediment in the reservoir, reconstruction of a new Clark Fork River channel and flood plain, and removal of the dam. As with the other dam removal alternatives, drop structures would be utilized to prevent excessive head cutting and erosion around critical structures (such as bridge abutments) and to limit uncontrolled channel alteration upstream. The expected outcome of implementation of this alternative would be as follows:

- The method and schedule for the removal of the sediment would influence the risks to downstream aquatic life and the potential impacts to the existing arsenic groundwater plume. The longer it takes, the greater the potential for an extreme hydrologic event to influence the remedial process.
- A potential for short term exacerbation of the groundwater arsenic plume exists during the sediment removal through exposure of the sediments and maintenance of constant head conditions with in the reservoir, assuming full pool.
- Contaminated groundwater would be remediated passively over a decade or so through natural attenuation and dilution. Elimination of the arsenic source for the plume would accelerate this process.
- From a risk reduction/cost ratio, this alternative would not be as cost effective as some of the other alternatives.

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10 Comparative Analysis of Alternatives

10.1 EPA's Nine Evaluation Criteria

The NCP at 40 CFR § 300.430(e)(9)(iii) and (f)(1)(i) requires EPA to utilize and evaluate the nine criteria listed at Section (e)(9)(iii) to select a remedial action for a site. Section 300.430(f)(5) requires EPA to document how the evaluation of the nine criteria were used to select a remedy. The major objective of this activity is to evaluate the relative performance of each alternative with respect to each criteria, and consider the tradeoffs of each, selecting one, or the combination of several, as a comprehensive remedy. This helps ensure that advantages and disadvantages of each alternative are clearly understood. The nine evaluation criteria are as follows:

- **Threshold Criteria**—*Must be Addressed*
  1. Overall Protection of Human Health and the Environment
  2. Compliance with ARARs
- **Balancing Criteria**—*Must be Considered*
  3. Long-Term Effectiveness and Permanence
  4. Reduction of Toxicity, Mobility, and Volume
  5. Short-Term Effectiveness
  6. Implementability
  7. Capital and Operating and Maintenance Cost
- **Modifying Criteria**—*Must be Considered*
  8. State Acceptance
  9. Community Acceptance

A brief description of each criterion follows in the remainder of this section (10.1). Section 10.2, *Comparison of Alternatives for Each Evaluation Criteria,* contains a text description of how the alternatives compared within each evaluation criterion, including State and community acceptance. This represents EPA's final evaluation of the criteria following receipt of public comments. Next, Exhibit 2-25, *Comparative Analysis of Alternatives for the Milltown Reservoir Combined Feasibility Study,* summarizes the evaluation of the first seven criteria that were presented in the *Combined Feasibility Study* (Atlantic Richfield Company 2002c). Because this ranking was completed long before the issuance of the *Original Proposed Plan* or *Revised Proposed Plan* and associated public comment periods, the modifying criteria of State and community acceptance were not included in this analysis. Since the public comment periods, these two factors were analyzed in the *Responsiveness Summary* (Part 3 of this *Record of Decision)* and in the consideration by EPA of the public comments and in further discussions with the State.

10.1.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through removal, treatment, engineering controls, or ICs. Particularly, the extent to which each alternative met the following was evaluated:

- Reduces or removes the source of arsenic that is currently sustaining the Milltown groundwater arsenic plume; allows the aquifer to naturally attenuate the plume over time.
- Reduces or removes the potential for remobilization of metals-laden sediment from the reservoir (by hydraulic or mechanical ice scouring) into the downstream flow path of the Clark Fork River; contributes to the health of the aquatic life downstream of the dam.
- Reduces chronic risks to aquatic receptors; these risks are associated with copper and zinc loading, and sedimentation during annual flows.
- Contributes to the restoration of the resource in a reasonable time period (several decades for groundwater and 4 to 7 years for surface water) and maintenance of the beneficial use of both surface and groundwater.

EPA Region 8 concluded that only the alternatives that lead to permanent prevention of ice scour events best meet this criteria. Such alternatives include components calling for sediment removal and restoration of the aquifer to its beneficial use. ICs and business or regulatory decisions that would involve retaining the dam are too uncertain and unreliable to completely meet this goal.

10.1.2 Compliance with ARARs

Section 121(d) of CERCLA and NCP 300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legal applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs." ARARs may be waived under CERCLA Section 121(d)(4). A complete list of ARARs and invoked waivers is included as Appendix A to this *Record of Decision*. That appendix contains appropriate definitions and descriptions of terms relevant to the ARAR identification and compliance analysis for this site. The ability of each alternative to meet the following key ARARs is highlighted in the analysis:

- **Contaminant Specific Criteria**—Considered groundwater and surface water quality criteria and the ability of each alternative to achieve water quality standards; and compliance with water quality standards under unique events, such as ice scouring.
- **Location Specific Criteria**—Federal and State solid waste and flood plain requirements, and ESA requirements were examined carefully.
- **Action Specific Criteria**—Includes Montana's Solid Waste Management Act and the proposed method for dealing with waste removal and disposal for each alternative.
- **Waived ARARs**—A waiver of the surface water quality ARARs is invoked during construction of the remedy, because the release of sediments during drawdown and excavation is unavoidable for this project. Temporary replacement standards are identified for construction activities, both for ambient concentrations and point sources.

EPA Region 8 determined that alternatives that remove dam and the most contaminated sediments meet this criteria by leading to compliance with groundwater ARARs within a reasonable timeframe. An up-front waiver of groundwater standards may not be possible at this site, since it is technically practicable to remove the sediments and remediate the groundwater within reasonable time frames to appropriate standards. Alternatives which left the dam and waste in place would not have met location specific ARARs.

10.1.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels are achieved. This criteria is an important one to the State, other Trustees, and the public, and is emphasized in the NCP and its preamble. Key issues examined under this criteria include the following:

- **Magnitude of Residual Risk**—Considered the future effects on surface water and aquatic systems (benthic macroinvertebrates and fisheries), groundwater and potable water supplies, and riparian ecosystems, especially if catastrophic releases occurred.
- **Adequacy and Reliability of Controls**—Considered the use and adequacy of perpetual dam maintenance and ICs.

EPA Region 8 concluded that dam and sediment removal alternatives best meet this criteria through avoidance of reliance on perpetual dam maintenance and upgrades, ICs, and elimination of residual risk.

10.1.4 Reduction of Toxicity, Mobility, and Volume through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the technologies that may be included in a given remedy. As applied to this site, reduction in mobility and volume of contamination within the flood plain is an important balancing consideration. This criterion evaluation focused on the effectiveness of physical removal of the most highly contaminated sediment to meet the objectives of reduction or elimination of mobility and volume, and breaking contaminant transport pathways.

EPA Region 8 concluded that sediment removal options best meet this criteria, by reducing mobility of contaminants through removal of the sediments from the fluvial system. Alternatives that left waste in place did not effectively meet this criterion.

10.1.5 Short-Term Effectiveness

Short term effectiveness addresses the period of time needed to implement a remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until cleanup levels are achieved. Detailed issues specific to this site that were especially considered included in the following:

- **Protection of Community and Workers During Remedial Actions**—Considered the volume of materials proposed to be dealt with, the methods of transporting the materials, and the time and safety elements. Alternatives that involved total or partial removal to a local repository with trucks as a method of transporting the material were generally considered be less protective. Use of rail cars to transport to an existing repository was considered more protective in the short term.

- **Environmental Impacts of Implementation**—Addressed impacts on surface water quality, including turbidity resulting from proposed activities, and short-term impacts on the stability of the groundwater arsenic plume. Wetlands impacts were also considered.
- **Time Until Remedial Action Objectives are Achieved**—Considered how long the remedial action would take, once implemented, to achieve RAOs and performance standards. Alternatives that resulted in achievement of groundwater standards within a reasonable time met the sub-criteria used—alternatives that did not meet groundwater RAOs did not.

EPA Region 8 concluded that alternatives that allowed the dam to remain in place presented less short-term risk and less destruction of wetlands, but this is outweighed by the length of time until groundwater quality objectives and goals are met. Disposal of waste by rail haul to an existing repository had less short-term risk than truck haul to a local repository.

10.1.6 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Generally, factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are considered. Key issues for this site highlighted in the analysis of this criterion are as follows:

- **Technical Feasibility**—Considered ability to construct and operate the technology, time required for implementation, reliability of the technology, ability to monitor effectiveness, and ease of undertaking additional actions should they be necessary at some future date.
- **Administrative Feasibility**—Considered ability to obtain approvals and coordinate with other agencies. This included working with counties and municipalities, as well as State and federal regulatory authorities.
- **Availability of Services and Facilities**—Considered the availability of necessary equipment, specialists, materials (including backfill materials), and the availability of offsite facilities for disposal of wastes.

EPA Region 8 concluded that alternatives that allow the dam to remain in place are more implementable, but less reliable. EPA worked closely with the other governmental stakeholders, the Atlantic Richfield Company, and the USACE to plan a dam and sediment removal option that is implementable and cost effective.

10.1.7 Capital and Operating and Maintenance Cost

This criteria involved the comparison of net present worth costs for each alternative as proposed. See Exhibit 2-24, presented earlier in Section 9.2, *Combined FS Alternatives Descriptions*, for a list of projected alternative costs. Cost effectiveness was then considered, as described in NCP Section 300.430(f)(ii)(D).

It should be noted that all alternatives that involve keeping the dam in place may have considerable additional costs associated with dam safety and fish passage upgrades. Again, EPA worked closely with the governmental stakeholders, the USACE, and the Atlantic Richfield Company to maximize cost effectiveness of the Selected Remedy.

10.1.8 State and Community Acceptance

Of the nine criteria available to evaluate various cleanup alternatives for the MRSOU, the *Combined Feasibility Study* examined the first seven, which are the **threshold** and **balancing** criteria. These criteria were evaluated again after receipt of public comment and during the selection of the remedy. The remaining two criteria, State acceptance and community acceptance, are the **modifying** criteria and were carefully evaluated after the public comment period on the *Revised Proposed Plan*. It is clear that the State and community concur with EPA's Selected Remedy of dam and partial sediment removal. Part 3, *Responsiveness Summary*, of this *Record of Decision*, describes the comments received, provides EPA's responses, and illustrates support for the Selected Remedy.

Three different departments within the State of Montana are involved in the Milltown Superfund project: DEQ, FWP, and NRDP. All three departments have expressed strong support for dam and sediment removal, citing the importance of cleaning up a drinking water aquifer, providing a permanent remedy without future uncertainty, restoring the native fisheries, and returning the Clark Fork and Blackfoot rivers to a free-flowing state. Montana's Governor and Attorney General also support dam and sediment removal.

Two other Trustees at the Milltown Site, the CSKT and the USFWS, are both on record strongly in support of dam and sediment removal. The CSKT have treaty rights along the Clark Fork and Blackfoot Rivers and cite the importance of leaving a clean, healthy environment for future generations and the importance of a restored fishery as rationale for supporting dam and sediment removal. USFWS strongly supports dam and sediment removal, stating that any short term impacts are far outweighed by the long-term improvement in water quality, the fishery, and overall health of the Clark Fork River.

In addition, Missoula City and County have both passed bi-partisan, unanimous resolutions calling for dam and sediment removal as the appropriate remedial action for the Milltown OU and for the restoration of the Clark Fork and Blackfoot Rivers. Both entities strongly supported dam and sediment removal during the public comment periods.

Finally, overall community acceptance did play an important role in the selection of the Remedy. EPA received several thousand letters and postcards prior to the *Original Proposed Plan*, indicating a strong desire for dam and sediment removal at this site. After issuance of the *Original Proposed Plan*, EPA received support from approximately 88 percent of the commenters on the plan. The main concern raised by commenters was the location of the sediment repository at Bandman Flats. EPA modified its *Original Proposed Plan* in response to these comments, and issued the *Revised Proposed Plan* in 2004. EPA received comments supporting the plan from approximately 98 percent of the commenters on this plan. EPA also met with residents of Opportunity and Anaconda, Montana, where the rail-hauled waste will be disposed. EPA answered questions about the disposal plans for this area, which is on Atlantic Richfield Company-owned property and is away from residential areas in Opportunity and Anaconda. EPA also received public comment concerning wetland protection or replacement, the integration of restoration, and historical mitigation. EPA has considered all public input carefully, and has modified the Selected Remedy to address issues of public concern where possible. EPA's detailed response to all comments is contained in the *Responsiveness Summary* portion of this *Record of Decision*, Part 3.

10.2 Comparison of Alternatives for Each Evaluation Criteria

Additional detail about how the alternatives compared based on the nine evaluation criteria is provided in the remainder of this section. This analysis expands on and modifies the *Combined Feasibility Study* analysis (see Exhibit 2-25).

10.2.1 Overall Protection of Human Health and the Environment

Each alternative, except Alternative 1, included human health protection components. Alternative 1, the No Action Alternative, does not address the unacceptable risks and pathways and therefore was not considered further. Alternatives 2A, 2B, 3A, and 3B emphasize enhanced reservoir management while retaining long term ICs for groundwater use and relying on natural attenuation without any source removal. This provides a measure of overall protection; however, because it relies on ICs that are not in place or that may change in time, it does not reliably address the human health risk pathways associated with the reservoir source sediments and the arsenic contamination of groundwater. Under these alternatives, downstream aquatic life continues to be threatened by the residual risk of leaving large amounts of contaminated sediment in-place and susceptible to scour by high flows and ice formation, or by catastrophic release.

Alternatives 5, 6A, 6B, 7A1, 7A2, and 7B better met the threshold criteria of overall protectiveness. However, each of these alternatives have benefits and drawbacks as demonstrated in the *Combined Feasibility Study*. When compared to the others, Alternatives 5 and 6B provide less protection. Alternative 5 allows the source sediments to remain in-place, leaving them susceptible to scour during flooding and allowing them to potentially influence groundwater. Alternatives 6A and 6B allow a continued risk of future deposition and impoundment of contaminated sediment from upstream. Alternative 7, with dam and sediment removal options (A1, A2, B), appears to provide the best overall protection of human health and the environment. It directly addresses exposure pathways relative to arsenic in the groundwater, and scour and erosion risks associated with downstream sediment and copper loading.

10.2.2 Compliance with ARARs

Removal of the Milltown Dam and all the reservoir sediments (Alternatives 6B and 7B) presents the greatest opportunity to comply with ARARs. However, these alternatives may assume higher long-term risk of non-compliance during implementation because of the volume of material to be removed. An ARAR waiver is appropriate for construction-related violations of ARARs. Alternatives 2 through 5 would not meet groundwater ARARs, and would not likely meet location specific ARARs such as solid waste and ESA ARARs. Alternatives 2 through 7 would have similar effects on long-term surface water quality ARARs, because upstream water quality would be the dominant influence on surface water and would not change under any alternative. Alternatives 7A1 and 7A2 represent partial sediment removals and are the most likely to meet all ARARs and still remain viable from an implementability and cost effectiveness standpoint. Alternative 7A1 removes all of the lower reservoir sediment, while Alternative 7A2 only removes that portion of the sediment contributing to the groundwater plume. The unique method of sediment removal and the compressed schedule of Alternative 7A2 make it the most likely of all to meet surface water, groundwater, and solid waste ARARs.

10.2.3 Long-Term Effectiveness and Permanence

The long-term effectiveness and permanence criterion considers the expected residual risk and the ability to maintain reliable protection of human health and the environment after implementation of the remedy. Alternatives 1, 2A, 2B, 3A, 3B, and 6A leave the Milltown Dam and large volumes of contaminated sediments in place, resulting in long-term residual risk to human health and to downstream aquatic life. Because ICs and dam maintenance in perpetuity cannot be completely assured, the alternatives are considered less reliable or not permanent.

Alternatives that remove the dam and sediments provide the best long-term effectiveness and permanence. Alternative 5 removes the dam but relies on a re-excavated and armored channel to manage the erosion of source sediment. This alternative is more susceptible to mobilization of contaminated sediment during high flow events, rendering it less effective in the long-term and certainly not permanent. Alternatives 6B, 7A1, and 7B endorse the removal of the dam and the entire lower reservoir or all the reservoir sediments. The time frame for completing such large removals is significant; however, once completed these alternatives would successfully meet the need for long-term effectiveness and permanence. Alternative 7A2 requires less sediment removal in a shorter time frame. The magnitude of residual risk is most favorable for these alternatives, although each will still require the implementation of groundwater ICs, but for a shorter period time than originally predicted.

10.2.4 Reduction of Toxicity, Mobility, and Volume through Treatment

Alternatives 5, 6A, 6B, 7A1, 7A2, and 7B address reduction in mobility and volume to a greater degree than other alternatives because they remove more contaminated sediment from the reservoir, where it is likely to become mobile over time. The physical removal of the sediments (the principal wastes) is a more reliable method for limiting mobility and reducing volume. The transport of the waste to Opportunity Ponds (an existing waste repository near Anaconda, Montana) for potential use as a vegetative cap under Alternative 7A2 will reduce the toxicity of this material by its upland deposition and amendment with lime and organic matter. Alternatives 1, 2A, 2B, 3A, and 3B do not reduce the toxicity, mobility, or volume as reliably as the other alternatives.

10.2.5 Short-Term Effectiveness

Large volumes of material would be removed in Alternatives 5, 6A, 6B, 7A1, and 7B. These alternatives pose a potential for greater short-term risk relative to climatic factors and hydrologic concerns (flooding, extreme ice flow events, etc.), occurrence of potential for traffic and equipment related accidents, risks to water quality during construction, risks to the stability of the flood plain, and the duration of the remedial activity before full implementation occurs. These alternatives would take a relatively longer period of time to implement. On the other hand, these alternatives would achieve groundwater performance standards more quickly. Alternative 7A2 exhibits concerns for greater short-term risk described above, but to a lesser degree because of its compressed time frame and smaller removal of sediment volume.

Alternatives 1, 2A, 2B, 3A, and 3B would have less short-term impact on the community and the environment because they are less intrusive as a remedy and retain a managed reservoir environment behind the dam to help control sediments that are liberated during the remedial activities. However, these alternatives would not achieve RAOs and associated ARARs for groundwater for centuries.

10.2.6 Implementability

Because of the large volumes of material that would be removed in Alternatives 5, 6A, 6B, 7A1, 7A2, and 7B, these alternatives are difficult to implement because they require considerable effort to coordinate with agencies, and may tax the local resources to transport excavated waste to repositories and backfill excavations. Alternatives involving local waste repositories would be difficult to implement because of the need to find appropriate land for such uses. Nevertheless, focused projects of this nature are being done and are feasible.

FERC's role in dam removal required detailed coordination activities. Alternatives 2A, 2B, 3A, and 3B would be somewhat more easily implemented because they do not require dam removal and involve less sediment removal. Enacting permanent ICs for groundwater may be administratively difficult because of the opposition to such controls by the local county government. Alternatives that leave waste in place would also require extensive coordination on dam safety upgrades.

EPA addressed some of the implementability issues associated with dam and sediment removal alternatives by 1) proposing to remove only the sediments that are most harmful to aquatic life and groundwater rather than larger areas in the original *Proposed Plan*; and 2) devising a modified version of that plan in the *Revised Proposed Plan* which eliminates the need for a local repository.

10.2.7 Cost

Alternatives 1, 2A, 2B, 3A, and 3B are least costly, but do not reliably achieve basic threshold criteria. Because of the large volumes of material that would be removed in Alternatives 5, 6A, 6B, 7A1, and 7B, they are much more costly than the other alternatives with 7B being the most costly, but they achieve significant benefits in terms of permanence. Alternatives 6A and 6B require ongoing and difficult re-dredging and maintenance activities, making these alternatives less cost effective than other removal alternatives. Alternative 7A2 falls about mid-range and is 52 percent of the cost of the most expensive alternative. Using the criteria found in NCP section 400.300(f)(ii)(D), EPA believes that Alternatives 7A1 and 7B would not be sufficiently cost effective, and that the overall effectiveness of Alternative 7A2, compared to its costs, best meets the cost effectiveness criteria.

10.2.8 State Acceptance

The State of Montana determined that removal is more protective and more fully complies with Montana ARARs than other alternatives that allow the sediments to remain in place.

DEQ believes removal of contamination offers a more permanent and effective remedy where contamination can feasibly and reliably be removed. DEQ's concerns regarding the MRSOU focus on surface and groundwater protection as well as ARAR compliance. DEQ considered public comment received on both the *Original Proposed Plan* and the *Revised Proposed Plan* prior to declaring their concurrence with the Selected Remedy. EPA has worked closely with the State in developing the Selected Remedy. The State's Concurrence Letter is provided in Appendix B.

10.2.9 Community Acceptance

In response to the *Original Proposed Plan* and *Revised Proposed Plan*, EPA received numerous comments. Approximately 88 percent of the comments on the *Original Proposed Plan* supported EPA's proposal, and 98 percent of the comments supported the *Revised Proposed Plan*. EPA values and has incorporated public input where possible and consistent with statutory and regulatory mandates and EPA guidance. The Selected Remedy has been modified in response to comments on the both *Proposed Plans*. The changes are explained in Section 12.1, *Rationale for the Selected Remedy;* Section 14, *Documentation of Significant Differences;* and in Part 3, *Responsiveness Summary.*

There has been substantial community input into this process and a large segment of the surrounding population and the City and County governments strongly urged EPA to select the dam and sediment removal option. EPA received public opposition to the proposed repository location (Bandman Flats) and the location of the rail loading area during the public comment period on the *Original Proposed Plan*. The Selected Remedy places the rail loading area down on the reservoir site, which is much more isolated from the community. EPA believes that the Selected Remedy, with its adjustments after the *Original Proposed Plan*, is strongly endorsed by the community. The Selected Remedy provides a locally acceptable waste loading area, and a disposal option that actually lessens community impacts.

The number of people who supported or did not support the proposed remedy, as well as a description of their comments, is provided in Part 3, *Responsiveness Summary*, Section 2, *Original Proposed Plan Comments and Responses*, and Section 3, *Revised Proposed Plan Comments and Responses*. The *Responsiveness Summary* also summarizes any significant concerns that people expressed following the release of both *Proposed Plans* and includes responses to those concerns by EPA and DEQ.

In summary, EPA has received strong support for a clean-up of the Milltown Sediments and restoring the Clark Fork and Blackfoot Rivers to a free flowing condition. EPA notes concerns expressed with respect to sediment release during the implementation of the remedy, and other concerns regarding the creation of a natural-appearing channel following sediment removal. EPA supports the use of a variety of remedial actions to assist with the clean-up effort and to minimize the release of sediments, including bypass channel construction, careful sequencing of construction activities, and real time monitoring of water quality. EPA worked closely with the State NRDP and other Trustees to address their concerns and to integrate restoration with remediation, which was a community concern. EPA recognizes the potential hardship on the community during clean-up activities and plans to coordinate closely with residents to formulate a successful clean-up.

10.2.10 Conclusion of Alternative/Criteria Evaluation

Alternative 7A2, with several modifications as described in the *Original Proposed Plan* and the *Revised Proposed Plan*, is identified by EPA as the Selected Remedy. The complete Selected Remedy is described in detail in Section 12 of this *Record of Decision*. The Selected Remedy meets the threshold criteria, and reflects a fair balance between long-term effectiveness and permanence, short-term effectiveness, reduction of mobility, toxicity, and volume, and implementability issues associated with these alternatives. Long-term effectiveness and permanence weighed heavily in EPA's decision to require the removal of the source sediments in Area 1. Reduction in mobility and volume associated with removal and disposal to an existing repository where the sediment's toxicity will be reduced through its possible use as a vegetative capping media also influenced the choice of the Selected Remedy. EPA carefully examined the short-term effectiveness and implementability criteria, and believes these issues can be managed under EPA's Selected Remedy. ARAR compliance will be achieved under the Selected Remedy, and a waiver of water quality standards during construction activities, accompanied with protective replacement standards, is appropriate. Removal of the source sediments and Milltown Dam, and the associated cooperative action of removal of the Stimson Dam, restores the rivers to free flow and promotes overall protectiveness and long-term effectiveness. Application of dry removal procedures to the sediments will lessen short-term safety and environmental impacts, and allow for a shorter remedial action construction period. EPA believes the Selected Remedy is cost effective and will achieve benefits and effectiveness proportional to the expected costs. EPA and DEQ aim to address public concerns regarding impacts to water quality from the remediation by constructing a bypass channel and sequencing construction activities to allow for scour and dispersion of sediments to occur during high flow periods during implementation. Finally, State acceptance was important to EPA, so coordination with the State's restoration activities was facilitated and is reflected in the Selected Remedy.

EXHIBIT 2-25
Comparative Analysis of Alternatives for the Milltown Reservoir Combined Feasibility Study

	Comparative Analysis of Remedial Alternatives*						
	Threshold Criteria		Balancing Criteria				
Alternatives	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, and Volume Through Treatment	Short-Term Effectiveness	Implementability	Capital/ Operating and Maintenance Cost
1	Not Protective	NR	NR	NR	NR	NR	NR
2A	M-H	M	M	L-M	H	H	H
2B	M	M	M	M	M-H	M	M-H
3A	M-H	M	M	L-M	H	M-H	M-H
3B	M	M	M	M	M	M	M
5	M	M	L-M	M	M	M	L-M
6A	M	M-H	M-H	M-H	L-M	M	L-M
6B	M	M-H	M-H	M-H	L	M	L
7A	M-H	M	H	M-H	L-M	M	L-M
7B	M-H	M	H	M-H	L	L-M	L

Notes:

*Alternatives are scored based on relative achievement of the criterion compared to other alternatives using the following ranking system: L = low achievement; L-M = low to moderate achievement; M = moderate achievement; M-H = moderate to high achievement and H = high achievement; NR = Not Rated.

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11 Principal Threat Wastes

Principal threat wastes are source materials considered to be highly toxic or highly mobile that generally cannot be contained in a reliable manner or present a significant risk to human health or the environment, should exposure occur. The NCP establishes an expectation that EPA will use treatment to address principal threats posed by a site wherever practicable [NCP § 300.430(a)(1)(iii)(A)], but recognizes that treatment is not always possible. A source material is one that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air, or acts as a source for direct unacceptable exposure.

Arsenic in mine wastes mixed with sediment has been determined to be the principal threat to human health within the MRSOU. If people were to continue to consume the contaminated groundwater that primarily results from these sediments, both non-cancer and cancer risks from arsenic are in the range of concern (*Human Health Risk Assessment*, EPA 1993b).

The historic reservoir sediments, particularly in the area designated as Area 1, exhibit the highest concentrations of arsenic and copper, and present the major principal threat waste at the MRSOU. Geochemical conditions created by the oxidation/reduction state of saturated impounded sediments in this area results in the mobilization of dissolved arsenic and metals into sediment pore water. The contaminated pore water then flows downward through the sediments into the alluvial aquifer (groundwater). Concentrations of arsenic and metals in the reservoir sediments, if not remediated, have the potential to continue to contribute these contaminants to the local alluvial aquifer in high concentrations for hundreds to thousands of years. The historic sediments, during conditions with potential for flow-induced or mechanical scouring, have the potential to contribute high concentrations of total and dissolved copper to the river. Copper is highly toxic to aquatic life and this source and pathway present an acute risk to aquatic life in the Clark Fork River downstream of the MRSOU.

This principal threat waste contaminates a prolific aquifer and leads to the loss of the beneficial use of that aquifer as a potable water supply. Under other conditions, the principal threat wastes can be scoured and re-entrained in the downstream surface water column, resulting in significant impacts to downstream aquatic life (EPA 2000).

Section 430(a)(1)(iii)(A) and EPA guidance states EPA's expectation that principal threat wastes will be addressed with reliable "treatment." For mobile waste in areas of active fluvial deposition/flood plains associated with acute risks, such as the reservoir sediments, removal and permanent disposal outside of the 100-year flood plain is required. EPA has thus focused its most aggressive remedial actions towards these principal waste areas. These wastes may be treated at the Anaconda Site. Other areas that are addressed in this remedy, such as the impacted areas associated with zones of contaminated groundwater, present unacceptable risk conditions. EPA believes the application of ICs to these areas is an appropriate measure until the remedy has had time to mitigate conditions in these areas.

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12 Selected Remedy

The *Original Proposed Plan* (EPA 2003) described and summarized the characteristics of the areas that may be contaminated, the wastes that each media may contain, and how the proposed remedy approach addresses each of these. The *Original Proposed Plan* was presented to the public and comments were received from many individuals, organizations, State and Federal Trustees, and other groups. In response to those comments and a revised proposal from Atlantic Richfield Company regarding the removal of contaminated sediments, the *Original Proposed Plan* was revised. The *Revised Proposed Plan* was presented to the public in May 2004 and comments were once again requested from the public and the Trustees. EPA has responded to all significant comments. These comments and responses are found in Part 3, *Responsiveness Summary*, of this *Record of Decision*. Responses to specific comments on the *Revised Proposed Plan* received from Atlantic Richfield Company and NorthWestern Corporation are also provided in Part 3, *Responsiveness Summary*.

The Selected Remedy is defined and described in this section, as are the general priorities for action.

12.1 Rationale for the Selected Remedy

As summarized in Section 10, *Comparative Analysis of Alternatives*, detailed criteria were developed and applied by EPA Region 8 to compare among the alternatives. The performance of each alternative was evaluated against threshold criteria, balancing criteria, and modifying criteria. The selected remedy for the MRSOU is a modified version of *Combined Feasibility Study* Alternative 7A2, Partial Dam Removal with Partial Sediment Removal of the Lower Reservoir plus Groundwater ICs and Natural Attenuation within the Aquifer Plume.

As described in Section 10, *Comparative Analysis of Alternatives*, the two alternatives that scored the most favorably when looking at the first seven criteria were Alternative 2A, Modification of Dam and Operational Practices, and Alternative 7A2 modified, which involves dam and sediment removal. Other alternatives did not meet threshold criteria and did not provide sufficient reliability or permanence. Alternative 2A would have modified the dam with a pneumatic crest, imposed groundwater ICs and other operational BMPs, and incorporated substantial FERC improvements to accommodate stability issues associated with the north abutment and fish passage. The projected cost was approximately $21 million, and it required operation and maintenance in perpetuity. Actual costs may have been higher. A dam safety consultant hired by Missoula County estimated an additional $30 to $50 million may be necessary to upgrade the spillway section of the dam (FERC required additional geotechnical studies to be conducted—in October 2002—to determine the degree of upgrades necessary for the spillway section of the dam). The threat of contaminated sediment release from the stored sediments as a function of climatic conditions, although reduced, would not have been eliminated.

Alternative 7A2, modified, which called for dam decommissioning and removal with lower reservoir sediment removal and channel reconstruction, was proposed by Region 8 in the *Original* and *Revised Proposed Plans* for a variety of reasons. This alternative meets groundwater ARARs (Alternative 2A would not), it offers the best opportunity for long-term protection of human and environmental health, and it is supported by the community, the State, and the CSKT. Importantly, Alternative 7A2 complies with groundwater ARAR standards relevant to Missoula's sole source aquifer, which is used for domestic consumption. Alternative 7A2, modified, scored high in long-term effectiveness and permanence because it does not require significant ongoing maintenance, since the dam and sediment are removed. It does not rely on groundwater ICs in perpetuity for protection of human health. This is fortunate because groundwater ICs are opposed by the local county government and local controls may not be implemented. This alternative is strongly favored by the larger Missoula area community (98 percent), including local elected officials, the State, the CSKT, the USFWS, and other stakeholders.

The score for short-term effectiveness for this alternative was low-moderate because of potential negative impacts on downstream aquatic life during reservoir drawdown and remedy construction. Implementation of this remedy is complex. High costs are associated with this remedy. However, EPA believes that these criteria considerations are balanced by the significant ARAR compliance, long-term effectiveness and permanence, and reduction in mobility and volume achieved by the Selected Remedy. The EPA cost of this remedy is approximately $106 million. The USACE developed a detailed cost estimate for the selected alternative. This cost estimate and its associated work breakdown structure is discussed in more detail in Section 12.9, *Cost Estimate for the Selected Remedy*. The RPs have estimated much lower costs. As noted earlier, EPA finds the benefits gained are proportional to the costs, in accordance with CERCLA and the NCP.

Implementation of the Selected Remedy will allow recovery of the aquifer within a much shorter time period (4 to 10 years) versus Alternative 2A (200 to 2,000 years). Recovery of the aquifer is much quicker under the Selected Remedy because the major source of groundwater contamination, the reservoir source sediment and the hydraulic head driving the arsenic into the alluvial aquifer, are significantly changed and for the most part eliminated. This ability to achieve groundwater RAOs in a relatively short period of time is a favorable factor.

During the comment periods for the *Original Proposed Plan* (2003) and *Revised Proposed Plan* (2004), EPA Region 8 also received some comments advocating sediment removal and leaving the dam in place. This option did not warrant as much consideration as the Selected Remedy because it is costly to maintain, it does not provide a permanent remedy since numerous dam upgrades and periodic dredging would be required, and offers no increase in environmental protection over other alternatives.

12.2 Description of the Selected Remedy

The primary objectives of this remedy are to reduce or eliminate the groundwater arsenic plume, and reduce a threat to aquatic life below the dam from the release of contaminated sediments. This will be accomplished by removing the dam, removing the primary source of contaminated sediment in the reservoir, and allowing natural attenuation processes to restore the aquifer over time.

Only those sediments shown to be contributing directly to existing groundwater degradation (sediments with the highest pore water contaminant concentrations), and with the potential to contribute to future surface water degradation, will be removed to meet remedial objectives. The reservoir sediments are divided into two sections: the upper and lower reservoir sediment areas (the Duck Bridge dike and abutments form the dividing line). These two reservoir sections are further delineated into sub-areas based on sediment accumulation features (see Exhibit 2-2, *Key Sediment Accumulation Areas*). The lower reservoir is comprised of Areas 1, 2, and 3. The upper reservoir encompasses Areas 4 and 5. The sediments in Area 1 (lower reservoir adjacent to Milltown) will be removed and isolated from the Clark Fork River channel, while most of those in Areas 2, 3, 4, and 5 will initially be left in place (some Area 3 sediments will be removed). Further removal of sediments may be necessary if groundwater RAOs are not achieved and removal is feasible. A new river channel with flood plains for lateral stability will be designed through Area 1, constructed, and vegetated to provide adequate stability against erosion.

Alternative 7A2 modified, as defined in this *Record of Decision*, includes removal of the spillway of the Milltown Dam. Additional restoration actions will remove the powerhouse and right abutment and divider block. This will leave the river to flow freely through the constricted confluence point of the rivers. Four to five construction seasons are estimated to implement the Selected Remedy. Other elements of the Selected Remedy are described below.

12.2.1 Remediation—Restoration Coordination

Since the release of the *Original Proposed Plan*, the Natural Resource Trustees (USFWS, CSKT, and State of Montana), via the lead trustee (State of Montana), have released and taken public comment on their restoration plan (DCRP) and have issued a first amendment. As amended, the DCRP encompasses the area where the Milltown Reservoir has slowed the flow of the river and created areas of sediment deposition. Restoration activities will be closely coordinated with the Selected Remedy, specifically for the Blackfoot River from the Milltown Dam to just downstream of the Stimson Dam and the Clark Fork River from the I-90 bridge below the Milltown Dam up to the high reservoir level above Duck Bridge.

EPA has worked closely with the Trustees to integrate the remediation and restoration plans within the remediation project area (the area from the dam to Duck Bridge on the Clark Fork River arm of the reservoir and to the I-90 bridge on the Blackfoot River arm). EPA's *Original Proposed Plan* and Alternative 7A2 proposed the construction of an engineered and partially armored channel, which would have met remediation requirements. The DCRP adopted by the natural resource Trustees contains a different channel alignment and flood plain, which will produce a more natural and habitat friendly stream channel after the dam and sediments are removed. These elements of the DCRP in the project area will be done in lieu of EPA's proposed remediation channel. Because of this coordination, restoration aspects of the project are also presented in the figures shown in this document. The coordinated restoration elements include the following:

- Removal of the divider block/power house/north (right) abutment

- Changes in the flood plain topography and channel alignment throughout the entire MRSOU and below Milltown Dam.
- Implementation of soft stabilization/revegetation techniques to stabilize the channel

Another element of this project is the removal of the Stimson Dam, which is being planned as a cooperative effort through the USFWS National Fish Passage Program with matching funds.

12.3 Dam and Sediment Removal

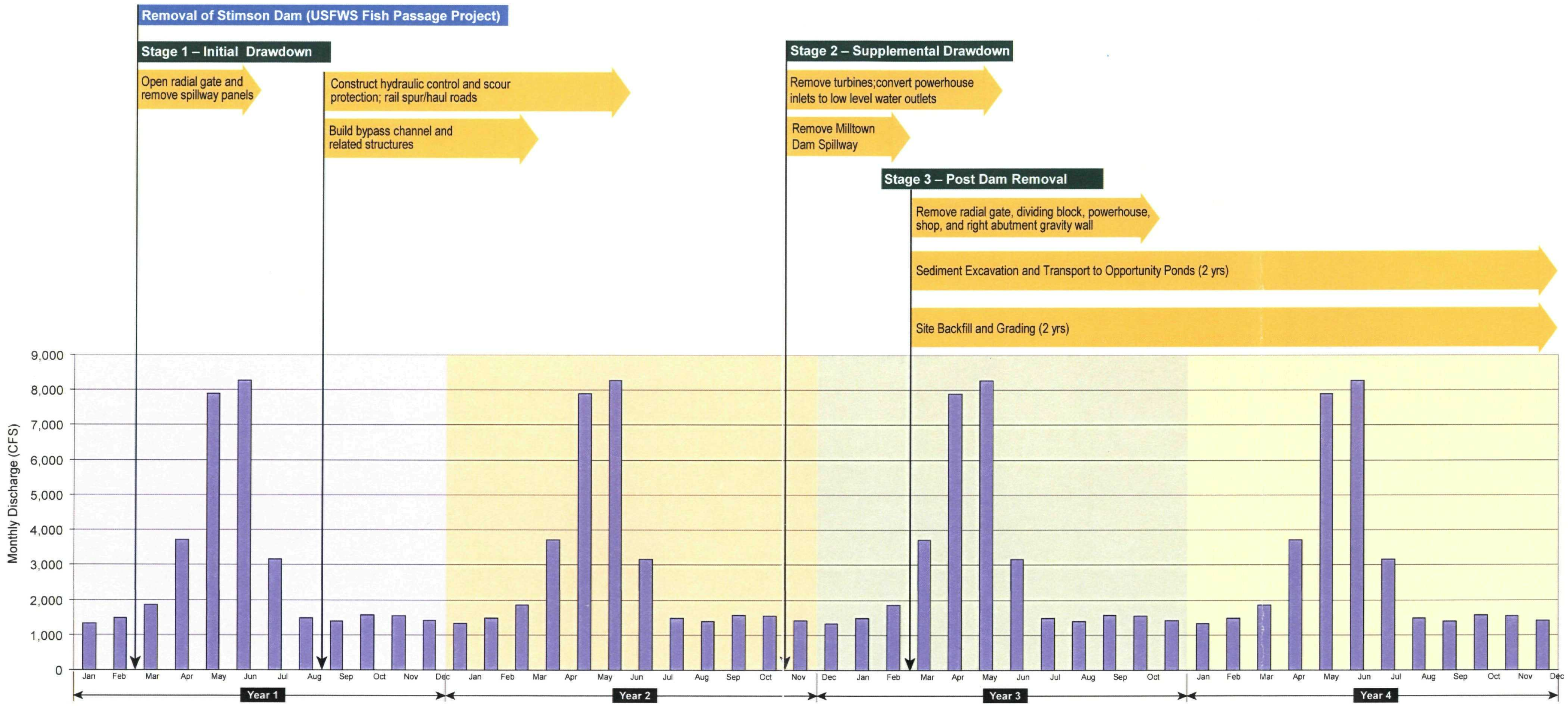
The removal of the source sediment is the foundation of the Selected Remedy. The sediment residing in Area 1 (2.6 mcy) comprises the primary and initial target of the remedial action. The actual volume to be removed could be somewhat smaller after accounting for clean surficial sediment that may be salvaged for re-use onsite as topsoil, in addition to uncertainties in defining the bottom of the sediment at the alluvial contact. Area 1 is approximately 4,300 feet long by an average of 800 feet wide and forms an elongated wedge of partially submerged land bounded by the Clark Fork River to the southwest, Duck Bridge to the south, I-90 to the east, and the Blackfoot River channel to the north. This area is oriented southeast to northwest (closest to the dam) within the reservoir. Sediment thickness increases in the same orientation from approximately 14 feet in the south, to 20 or 25 feet in the north.

The timing or sequencing of construction activities for this remedy are critical to avoiding uncontrolled impacts to the local water resources. The following sections describe significant activities that comprise this aspect of the Selected Remedy. The discussion is presented in the general order in which the construction activities are expected to occur, thus giving the reader an appreciation of the timing that is so critical to successful implementation of the remedy. The information and sequence of events described in this section are conceptual in nature and may change in the final remedial design following issuance of this *Record of Decision*. The anticipated sequence is illustrated in Exhibit 2-26, *Remedial Construction Activities and Clark Fork River Hydrograph*.

12.3.1 Bypass Construction

To reduce erosion within the existing Clark Fork River channel during reservoir drawdown and the removal of sediments from Area 1, a bypass channel will be constructed within Area 1 and the river will be to routed to a new confluence point with the Blackfoot River. The conceptual bypass channel, which is expected to be approximately 100 feet wide at the bottom with 3H:1V side slopes on the right embankment (looking downstream) and 2H:1V on the left bank, will be excavated into the underlying alluvium (up to 5 feet) to sustain the desired grade through the reach to its confluence with the Blackfoot River. The bypass channel will be required by EPA to contain a 100-year, 24-hour flood event; the actual dimensions of the channel will be determined during remedial design. The bypass channel will originate at the Duck Bridge abutments and be constructed to run adjacent and parallel to I-90 where it will intercept the Blackfoot River. In addition, modifications to the former Duck Bridge foundation remnants and dikes will be necessary. Prior to sediment removal activities, sediment in Area 1 will be isolated from the Clark Fork River at the head of the bypass channel (southeast end of Area 1 at Duck Bridge), as well as at the mouth of the channel where it connects with the Blackfoot River, by a wall of interlocking sheet piling driven into the underlying alluvium (see Exhibit 2-27, *Construction of Bypass Channel and*

EXHIBIT 2-26
Conceptual Illustration of Clark Fork River Hydrograph and Major Remedial Construction Activities



Note:
Hydrograph prepared from USGS Station No. 12340500, Period of Record 1929-2003.

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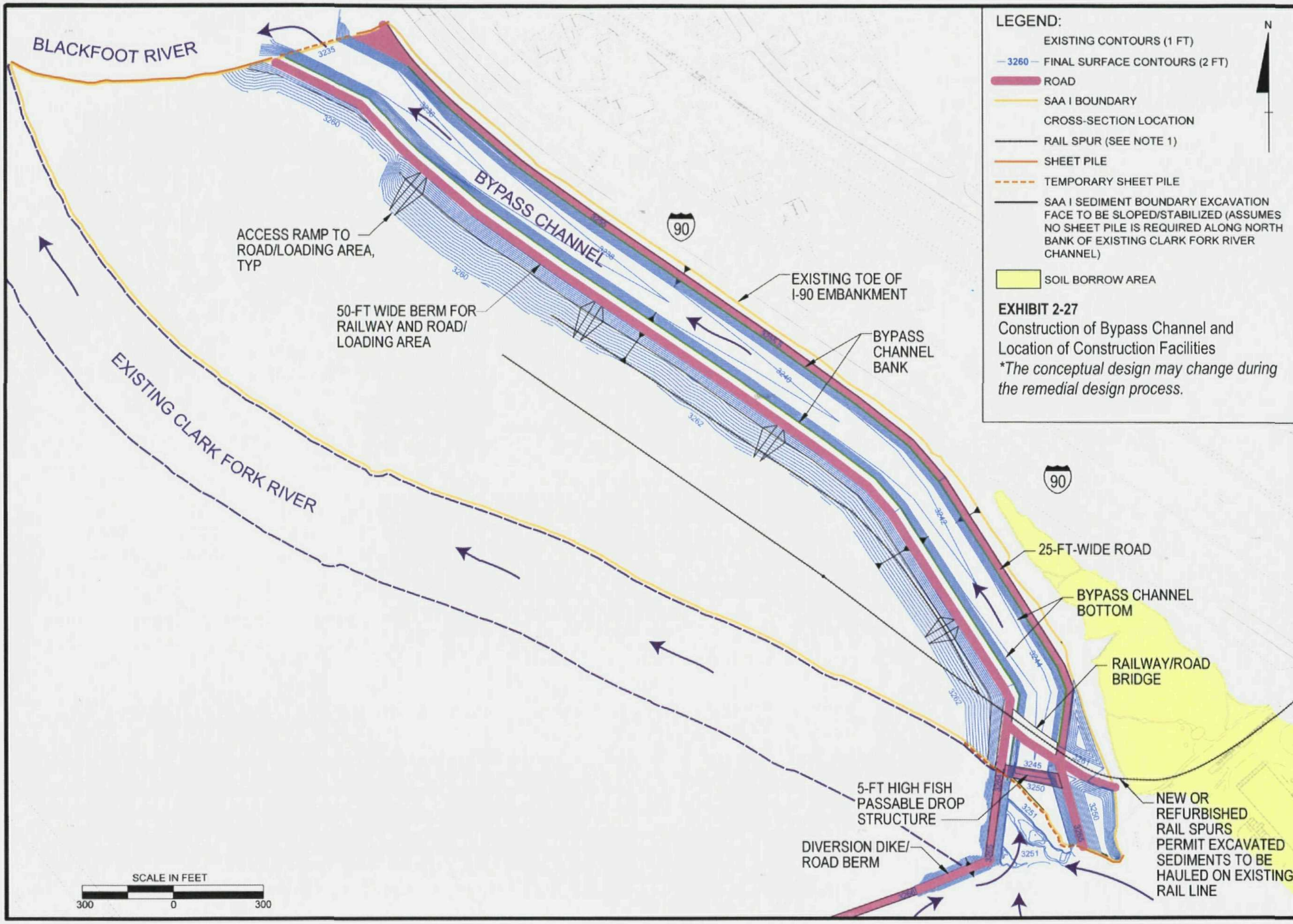


EXHIBIT 2-27
Construction of Bypass Channel and Location of Construction Facilities
**The conceptual design may change during the remedial design process.*

Location of Construction Facilities). The conceptual design also assumes an offset of a minimum of 20 feet from the existing toe of the I-90 embankment to provide added slope stability protection for the embankment. To facilitate the drainage of free water from within the sediments before construction of the bypass begins, the reservoir water level will be lowered approximately 8 to 10 feet below normal pool level using the existing radial gate. This action, in addition to possible pre-loading with clean soil, will initiate the potential "drying" and consolidation of the sediments.

Sediment removal from the bypass channel (approximately 600,000 cy) will be initiated with conventional excavation equipment such as tracked excavators or a dragline. The bypass will be excavated to an elevation that coincides with the underlying alluvium that acted as armoring for other historic channels. Grade control will be necessary to prevent unacceptable upstream headcutting (see Exhibit 2-28, *Conceptual Longitudinal Profile through Area 1*). A temporary, fish passable grade control structure for dissipating energy will be constructed. The bypass channel dimensions will be designed to accommodate a 24-hour 100-year storm event on the Clark Fork River. Channel side walls will be armored with appropriately sized rip rap or other erosion-resistant materials to prevent erosion during its use.

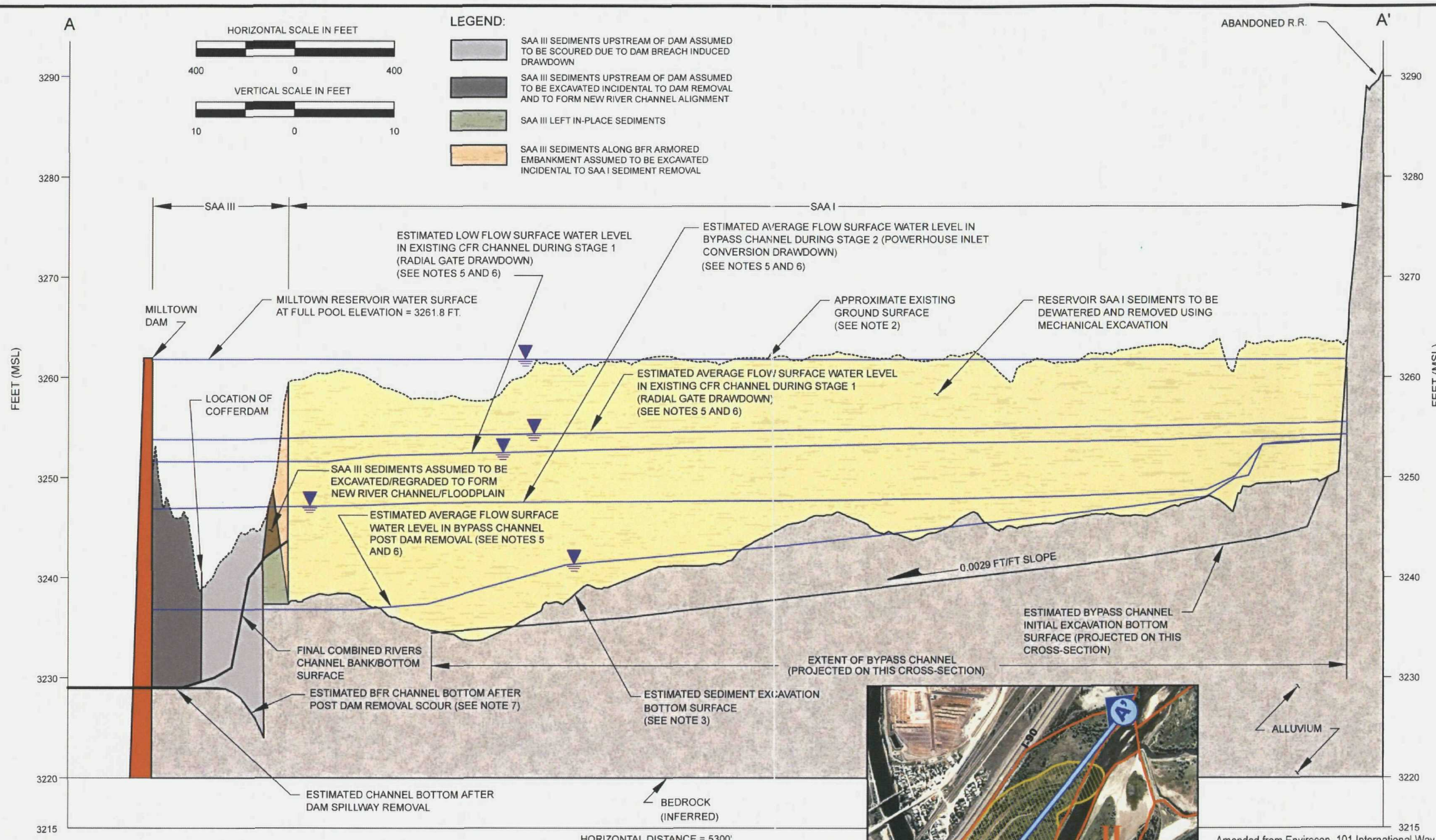
During bypass construction, the excavated materials will be stacked on the south side of the bypass channel and allowed to drain. Water management associated with saturated sediments is an important construction issue. The solution to this issue lies in the dewatering of the sediments and appropriate treatment of the effluent. Settling ponds with infiltration beds or galleries are being considered as a method for dealing with the water produced from dewatering efforts. Water quality sampling of the effluent during remedial design will dictate whether formal treatment and discharge into the river is an option.

At some point, a bridge crossing the bypass channel will be constructed to carry the rail spur to the south side of the channel. Sediment stockpiled from the bypass construction would be loaded into rail cars and hauled to an existing waste repository at the Anaconda Smelter Superfund Site. This repository for "dry" materials, called Opportunity Ponds, is located approximately 100 miles upstream. The bypass will be designed with the objective of achieving fish passage during low flow through bank full discharge periods (3,500 cfs).

During construction of the bypass channel, a cofferdam will be constructed across the front of the spillway of the Milltown Dam. The purpose of this structure is to isolate the spillway from the active channel to facilitate its removal at the appropriate time.

12.3.2 Dam Removals

Prior to routing the Clark Fork River through the bypass, the Stimson Dam will be demolished and removed as part of the associated cooperative project under the National Fish Passage program. Removing Stimson Dam will enable passage of bull trout and other fish up the Blackfoot River after the Milltown Dam is removed. This activity is scheduled for late fall or early winter to take advantage of low seasonal discharge on the rivers. The Stimson Dam, a pre-1900 wood crib structure, is located approximately 1.5 miles upstream of the Milltown Dam on the Blackfoot River. The Stimson Dam was built to create a backwater into which logs coming down the Blackfoot River could be staged and recovered from the river for processing in the adjacent timber mill (located on the south bank of the river). The mill is presently owned and operated by Stimson Lumber Company. The backwater created by the dam is no longer used by the mill and Stimson Lumber Company is assisting with the removal process. It is anticipated that the removal of the Stimson Dam



NOTES:

1. ALL ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (MSL) NAVD88.
2. EXISTING GROUND SURFACE PROVIDED BY LAND & WATER CONSULTING, INC.'S 2003 TOPOGRAPHIC AND BATHYMETRIC SURVEY.
3. ESTIMATED SEDIMENT EXCAVATION BOTTOM SURFACE IS PRELIMINARY BASED ON: RESERVOIR SEDIMENT ISOPAC MAP FIGURE B-16 FROM THE REMEDIAL INVESTIGATION REPORT (ATLANTIC RICHFIELD, 1995) COMPARED TO THE 2003 TOPOGRAPHY; AND LIMITED SEDIMENT THICKNESS SOIL BORING DATA FROM 2003 REMEDIAL DESIGN FIELD INVESTIGATIONS. THIS SURFACE WILL BE UPDATED FOR THE DRAFT FINAL DESIGN BASED ON SUPPLEMENTAL SAA I DEPTH OF CONTAMINATION GRID SAMPLING TO BE PERFORMED SUMMER 2004.
4. FOR CROSS-SECTION A-A' PLAN VIEW LOCATION, SEE FIGURE 6.

NOTES (CONT.):

5. THE PREDICTED SURFACE WATER LEVELS IN SAA I SEDIMENTS WILL LIKELY BE HIGHER THAN THE DRAWN DOWN SURFACE WATER LEVELS IN THE EXISTING CFR AND/OR BYPASS CHANNEL, RESULTING IN A PERCENTAGE OF THE SEDIMENTS REMAINING SATURATED.
6. ESTIMATED AVERAGE FLOW SURFACE WATER LEVELS ARE BASED ON HEC-6 HYDRAULIC CALCULATIONS. THE ESTIMATED AVERAGE FLOW SURFACE WATER LEVELS IN THE EXISTING CFR AND/OR BYPASS CHANNEL ARE PROJECTED ONTO THIS CROSS-SECTION LOCATION.
7. ESTIMATED CHANNEL BOTTOM SCOUR SURFACE IS CONSERVATIVE BASED ON HEC-6 HYDRAULIC MODEL RESULTS PRESENTED IN THE MAY 17, 2004 'FINAL TECHNICAL MEMORANDUM, MILLTOWN RESERVOIR DRY REMOVAL SCOUR EVALUATION'.

Amended from Envirocon, 101 International Way, Missoula, Montana 59808

EXHIBIT 2-28
Conceptual Longitudinal Profile through Area 1

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will trigger the transport downstream of a small volume of sediment previously impounded by that dam. The backwater effect created by the Milltown Dam is expected to mitigate, through deposition, the transport of all but the finest sediment released.

Prior to the removal of the Milltown Dam's spillway, the coffer dam structures at the head and mouth of the bypass channel will be removed and the Clark Fork River will be directed down the restored channel. A substantial earth berm will be constructed across the existing Clark Fork River channel at Duck Bridge to prevent water from entering that channel.

Once the Stimson Dam is successfully removed, the bypass channel is functional, and the water is diverted into the channel, the spillway for the Milltown Dam will be dismantled and removed. As indicated previously, this will occur behind a coffer dam that will isolate the work from the flows in the river. The combined Clark Fork and Blackfoot river flows are being directed through the radial gate and turbine tubes of the powerhouse during this period. This activity is scheduled to be completed in late winter, if possible, to again take advantage of low seasonal flows. Once the spillway is dismantled, a new restored channel will be constructed. The coffer dam will slowly be eroded away as the combined river flows are directed to the new breach in the structure and the river is returned to a lower, more natural elevation. Once achieved, this minimal river elevation will be maintained throughout the construction period and will allow remaining sediments in Area 1 to drain more freely down to the new elevation of the river. A new coffer dam will be constructed to permit the subsequent dismantling of the powerhouse and right abutment.

The work described in this section will be completed before the beginning of spring runoff, which typically carries the high annual flows and sediment loads. Some scour of sediment is anticipated with the construction activities described above. Timing the completion of those activities with the start of spring runoff will allow the scouring of in-place sediments in the bypass and around the dams to occur during the period of highest seasonal flow, a natural period in which sediment transport is also at its seasonal high. Sequencing this work in this manner should mitigate impacts to downstream aquatic life that might otherwise have occurred as a result of residual sediment scouring.

12.3.3 Removal of Remaining Sediments Within Area 1

Sediment removal for the balance of sediment in Area 1 (remaining 2 mcy) may utilize, if necessary, an approach called pre-loading. Pre-loading means placing a layer of clean fill material (up to 9 feet thick) on top of the sediments in Area 1. The purpose of the pre-load is to force the underlying sediment to consolidate and release excess water to the previously lowered reservoir channel areas. This makes the soft, wet sediment material more stable for the operation of large equipment that will be needed for the excavation. EPA expects the clean fill will come from a local source.

The sediment removal process will use large excavators working a linear face to optimize production and minimize the area of exposed groundwater. The area will be quickly backfilled following excavation. The specific sequence and methodology for conducting the actual removal may change as a result of final design, but at this time, the anticipated construction process is as follows:

- The first excavator will remove the pre-load materials and create blending areas ahead of the sediment excavation operation. Pre-load material will also be loaded into trucks and used as backfill in areas where the sediment has been excavated. Concurrently, other excavators will remove the sediment, place it on an adjacent area where the pre-load material has been removed, and let it drain, if necessary. EPA anticipates that, even after spillway and radial gate removal, a small portion of the sediment will remain below the water table. This sediment will be stacked and allowed to drain naturally, mechanically dewatered, or mixed with drier sediment to improve its consistency, and the blended materials will be loaded into trucks and transported to the staging area by the rail spur.

12.3.4 Sediment Transportation and Disposal

At the rail staging and loadout area located between I-90 and the river, the sediment will be placed into rail cars. Rail transport will be provided by two unit trains of gondola rail cars. Rail transport will require approximately 26,500 to 29,000 rail car loads with 83-cy capacity cars to relocate the dewatered sediments to the Opportunity Ponds. Some sediment from Area 1 may remain for reclamation of borrow areas if approved by EPA, in consultation with the State, during the design process. The rail cars will be transported each night to Opportunity Ponds, so a train full of empty cars will be onsite for loading each morning. Exhibit 2-27, *Construction of Bypass Channel and Location of Construction Facilities*, shows the location of the new rail spur near Milltown. Exhibit 2-29, *Rail Spur at Opportunity Ponds*, shows the location and configuration of rail facilities at Opportunity Ponds. The dewatered sediments transported to Opportunity Ponds are considered potentially suitable for use as a reclamation growth media and may be used to cap Cell D at the Opportunity Ponds. Large or woody debris encountered during excavation may require additional handling and processing to reduce its size so it can be transported by rail to Opportunity Ponds or it may be disposed in local landfills. Rail transport of the sediment will require the construction of additional loading and unloading spurs and facilities to access the excavation and disposal sites. Long-term operation and maintenance of the transported materials at Opportunity will be the responsibility of Atlantic Richfield Company as part of its obligations within the Anaconda Smelter Superfund Site.

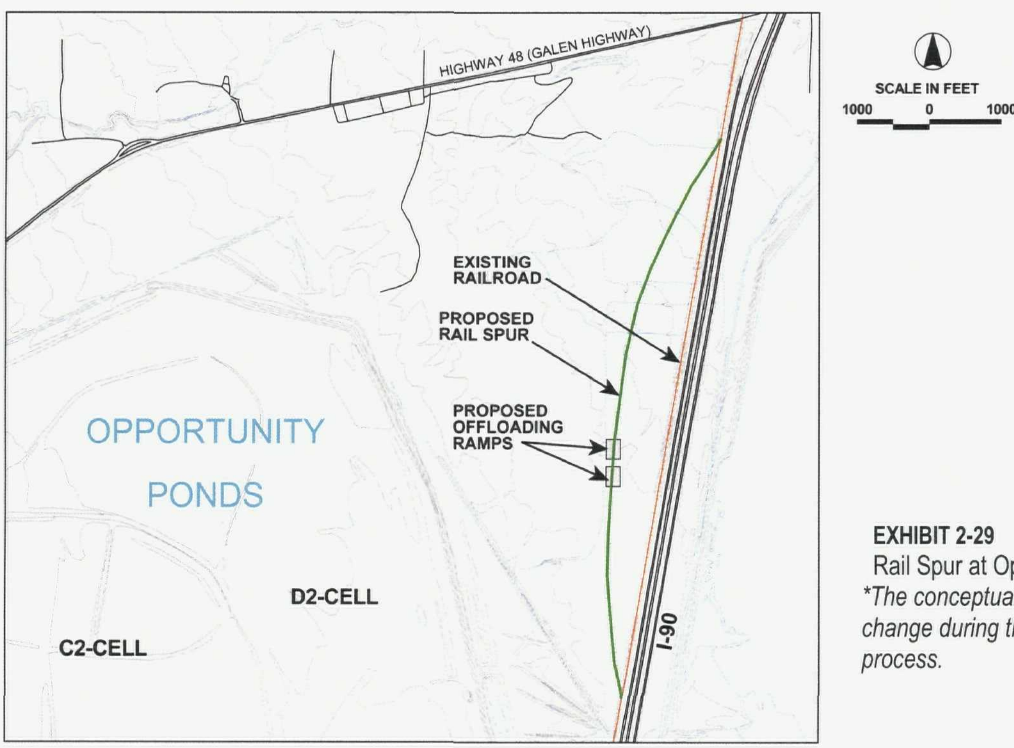


EXHIBIT 2-29
Rail Spur at Opportunity Ponds
**The conceptual design may change during the remedial design process.*

12.3.5 Dewatering

Dewatering of the lower sediments within Area 1 may be necessary if the sediments do not free-drain completely. For the proposed cleanup, EPA anticipates that some sediment dewatering will occur. An estimate of sediment pore water quality using sediment drainage test data collected by EPA during the 2002 drawdown study indicates that discharge of pore water into the Clark Fork River would not raise the river's dissolved arsenic and copper concentrations above EPA's temporary construction standards. Extraction wells and/or trenching may be used to aid dewatering. However, monitoring will be conducted and, if the impacts of returning excavation water to the river are found to be harmful or temporary standards are expected to be exceeded, the water will be treated or additional BMPs will be implemented before being discharged to the river.

12.3.6 Other Highly Contaminated Sediments

Certain higher metals-contaminated sediments in Area 3 (about 416,000 cy) located in the area shown on Exhibit 2-30, *Area 3 Sediment to be Left in Place and Isolated from the Floodplain*, may be left in place but will be isolated from the flood plain and will be armored through use of engineering controls to ensure that they are not eroded into the river. This area is to remain above the constructed river's 100-year flood plain and will be outside the extent of the regraded flood plain areas. The higher metals concentration sediments in Area 3 will need to be protected against potential erosional forces occurring from channel migration and high flows, including a 100-year flow event. Additional sediments containing higher metals adjacent to and underneath the eastbound lane of I-90 may be left in place. These sediments will be protected against erosion from up to a 100-year flood event. The remedy will also need to ensure long-term protection of these areas through appropriate ICs and operation and maintenance activities. A small portion of Area 3 will be removed.

Also, an identified 30,000 cubic yards of sediments directly in front of the dam within Area 3 will be removed. These sediments are located within the area that will be isolated by a cofferdam upstream of the spillway (see Exhibit 2-31, *Conceptual Model of Remedial Cleanup Plan*). This excavated material may, if practicable, be placed with the Area 3 materials that are to be left in place, isolated from the flood plain and armored from erosion as discussed above. If these sediments need to be dewatered, the water will be managed and treated the same way as pore water from Area 1.

Other highly contaminated materials that are excavated from other areas as part of the remedy will also be transported to the Opportunity Ponds, unless another appropriate disposal method is approved by EPA, in consultation with DEQ.

12.3.7 Infrastructure Protection

The remedy will be protective of infrastructure, including bridges located on the Blackfoot River between the Stimson Dam and the Milltown Dam and the Interstate 90 lower embankment. Sediment scour modeling indicates these bridge piers on the Blackfoot River will most likely require scour protection to maintain their integrity. Analyses of bridge scour and bridge pier protection for these bridges will be conducted as part of the remedy. The Interstate 90 embankment located on the north side of the site will be extended lower by the removal of sediment from Area 1. This embankment will need to be stabilized as part of the remedy. Both bridge protection and Interstate 90 embankment protection will meet Montana Department of Transportation specifications.

12.3.8 Clark Fork and Blackfoot River Channel Reconstruction/Restoration and Installation of Drop Structures

Concurrent with sediment removal, a new flood plain and channel will be constructed. The original channel and flood plain design, which reflected a highly engineered channel with a narrow 100-year flood plain within the project area, will be replaced with a design consistent with the DCRP. The plan proposes a more natural flood plain and channel design than presented in the *Original* and *Revised Proposed Plans* that will benefit fish and wildlife as well as local recreational use. The removal of the entire dam—including the powerhouse, divider block, and right abutment—allows for a wider, more natural channel and flood plain.

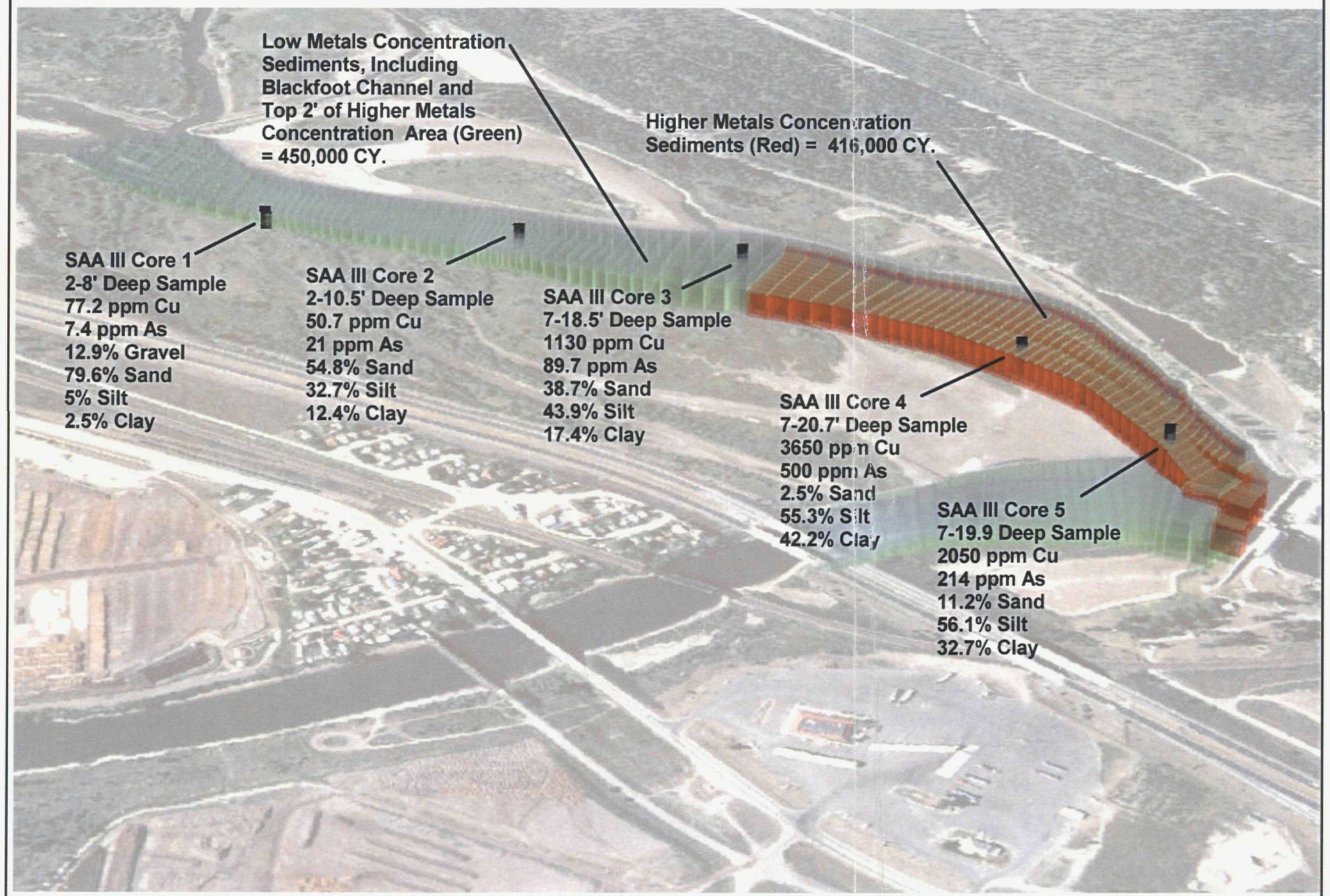
12.3.8.1 Reconstruction/Restoration Objectives

The following objectives will be addressed in the DCRP:

- Restore the confluence of the Blackfoot and Clark Fork Rivers to a naturally functioning, stable system appropriate for the geomorphic setting.
- Use native materials, to the extent practicable, for stabilizing channels, banks, and the flood plain to improve water quality by reducing bank erosion of contaminated sediments.
- Provide adequate channel and flood plain capacity to accommodate sediment transport and channel dynamics appropriate for the geomorphic setting.
- Provide high-quality habitat for fish and wildlife, including continuous upstream and downstream migration for all native and cold water fishes.
- Provide high-quality wetlands and riparian communities, where feasible and appropriate for the proposed stream type.
- Improve visual and aesthetic values through natural channel design, revegetation, and the use of native plants and materials.
- Minimize habitats that will promote non-native, undesirable fish species.
- Supplement revegetation activities proposed by remedy to increase flood plain vegetation diversity.
- Provide increased recreational opportunities compatible with other restoration goals, such as river boating and fishing.

12.3.8.2 Channel Design Elements

A new channel and flood plain for the Clark Fork River will be constructed extending from I-90 downstream of the dam to approximately 1.5 miles upstream of Duck Bridge. The new channel will reflect a "restoration" design that matches a natural meander pattern and gradient.



Notes:

1) Core sample information provided for deepest reservoir sediment sample collected during EPA's 2002 field investigation.

EXHIBIT 2-30
Area 3 Sediment to be Left in Place and Isolated from the Floodplain

SCALE IN FEET
1000 0 1000

Amended from
ENVIROCON
101 INTERNATIONAL WAY
MISSOULA, MONTANA 59808

Revision	1
ISSUED FOR:	Final Draft Technical Memorandum: Milltown Reservoir Dry Removal Scour Evaluation
Drawn	JJ
Checked	TW
Approved	DGB
Date	5-17-04
Dwg No.	

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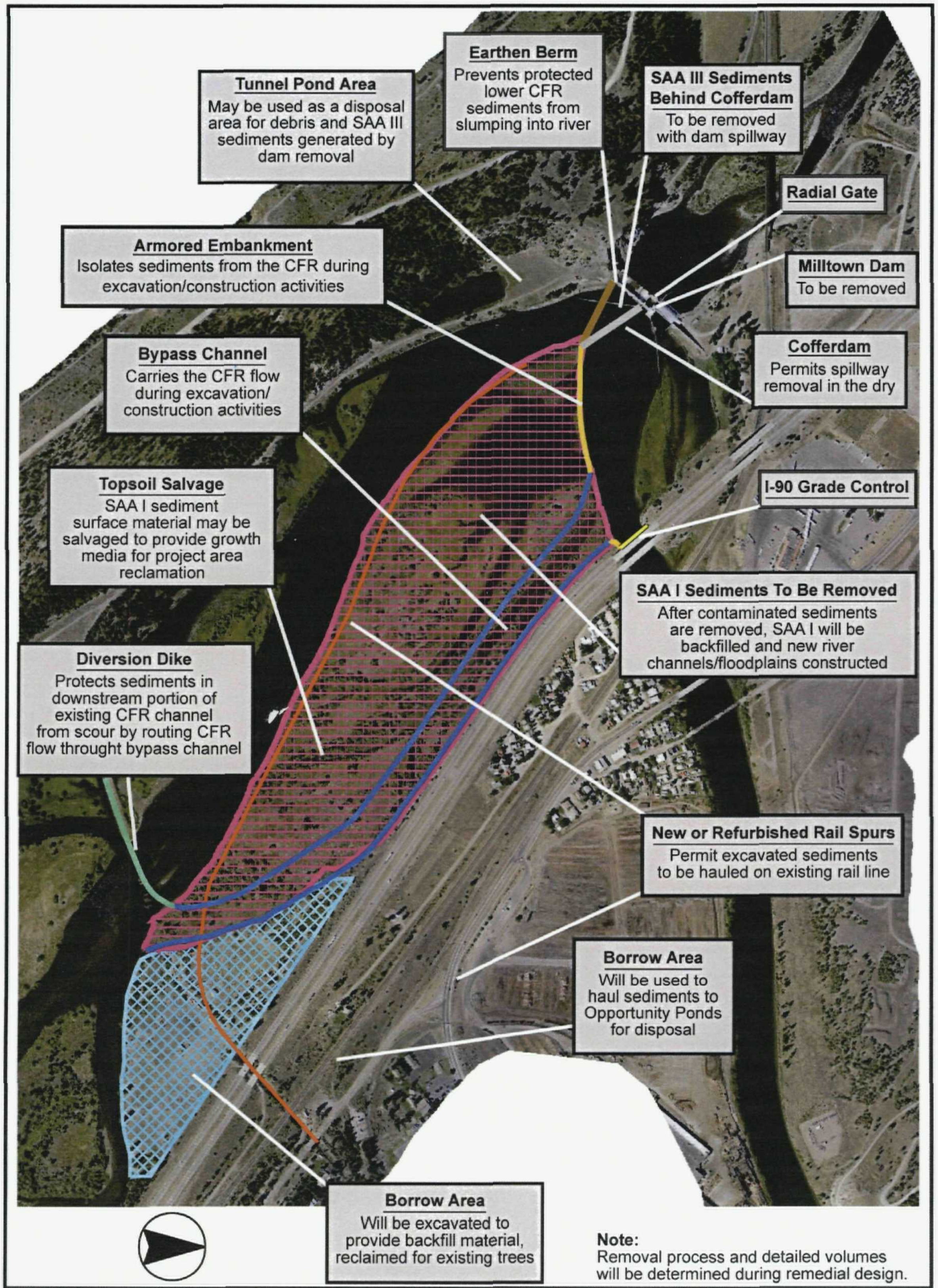

Note:
Removal process and detailed volumes will be determined during remedial design.

Drawn: TMG Checked: TW Approved: DGB Date: 11-23-04 Dwg. No: BG1089-A186	ISSUED FOR: DRAFT FINAL RD/RA STATEMENT OF WORK	Revision 1	**EXHIBIT 2-31** Conceptual Model of Remedial Cleanup Plan	Amended from ENVIROCON 101 INTERNATIONAL WAY MISSOULA, MONTANA 59808

In concept, it is anticipated that the reconstructed Clark Fork and Blackfoot river channels will range from approximately 115 feet to 175 feet wide with a typical water depth initially ranging from approximately 4 feet to 9 feet under average flow conditions. The new channel will extend to the alluvium and will be designed to carry the annual flood (1.5-year) rather than the 100-year flood as previously proposed under remediation. The actual channel design has not been finalized, nor will it, until the necessary remedial design/remedial action phase of the project has been approved. Native alluvium exposed after the removal of the overlying sediments is assumed to be acceptable as bed material for the reconstructed channels. Riverbanks will be reconstructed at a bankfull height that allows for out-of-bank flow when flows exceed a 1.5- to 2-year return interval. Bank stabilization of the reconstructed channels will be necessary to maintain geomorphic stability. Stabilization could include bioengineering approaches using vegetation, as well as in-stream and bank structures.

Channel grade control will be constructed along the project reach of the Clark Fork and Blackfoot Rivers to mitigate headcutting associated with the removal of the dam structures and the resultant drop in river base level. The channel restoration will incorporate gradual grade control along the reach with the use of many different kinds of structures designed to benefit riparian vegetation and habitats, natural channel processes, fish habitat, fish passage, flood plain function, recreation use consistent with restoration goals, and other resource goals. A preference exists for structures that use more natural gradients and vegetative armoring that would provide a more natural appearing and naturally functioning channel.

The flood plain will be designed adjacent to the active channel to accommodate a variety of flow regimes, including a 100-year event. Stream banks would be stabilized through a more natural approach using vegetation, rocks, and log structures designed to meet remedial objectives. No rip-rap or armored banks are proposed. When the new channel is completed, the present, pre-remedial Clark Fork River channel will be abandoned, backfilled, and regraded into flood plain.

12.4 Control of Sediment Releases During Construction

An important factor in EPA's and DEQ's choice of this remedy was an evaluation of the downstream impact of reservoir sediments potentially scoured as the reservoir pool and river levels are lowered to accommodate removal of sediments. Of particular concern was the following:

- Volume of scoured sediments and associated concentration of metals, arsenic, and TSS released
- Potential downstream impact of these sediments
- Methods for controlling and mitigating these potential impacts
- Monitoring during and after cleanup activities

To assess and evaluate these concerns, EPA required Atlantic Richfield Company to run a sediment scour model under a variety of flow conditions. The USACE model HEC 6 was used to make the calculations needed. EPA employed a panel of sediment experts from the

USACE, U.S. Bureau of Reclamation, EPA's Research and Development Lab (Athens, Georgia), and industry to provide technical support in evaluating the results.

Conservative input data and assumptions were used in sediment scour modeling calculations so the values reported represent the upper range of sediment transport that is expected to occur during construction. The following section briefly describes these issues. For additional details concerning these issues please see *Final Technical Memorandum – Milltown Reservoir Dry Removal Scour Evaluation* (Envirocon 2004) and *Addendum 1 Updated Scour Evaluation* (Envirocon 2004) on the EPA Milltown website or in EPA's Administrative Record. In summary:

- Modeling results estimate that approximately 478,000 tons (406,000 cy) of additional sediment (sediment above and beyond that moving through the reservoir in an average year) will be scoured from the Milltown Reservoir during a 4-year construction period.
- The concentrations of dissolved metals moving downstream during construction are estimated to be similar to those seen during normal high flow events.
- EPA expects little or no effect on downstream aquatic life resulting from metals released during construction. The release of high levels of TSS will likely have a temporary negative impact on aquatic life during the remedial action.
- Sediment releases should not pollute downstream drinking water supplies because of the expected low concentrations of dissolved arsenic being released.
- Deposition of sediment should not cause problems for downstream public infrastructure. There is a potential for some temporary problems at irrigation intakes where coarse particles may settle and constrict intakes. These areas will be monitored and problems will be corrected as part of the remedy. Equipment will be available to clean out downstream irrigation intakes to ensure they are not constricted.
- The majority of the sediment will be transported downstream, mixed with other channel sediment, and ultimately come to rest in depositional areas downstream such as Thompson Falls and Noxon Reservoirs. The amount released from Milltown as a result of construction activities is relatively small when compared to the amounts entering downstream reservoirs on a routine basis (see Exhibit 2-32, *Annual Sediment Loads – Estimated Yield for Bypass versus Historic Long-Term Averages and Sediment Loads from High Flow Years*.
- Several key engineering controls and BMPs will be used to protect downstream water quality. They consist of isolating the most highly contaminated sediments with sheet piling and a bypass channel, and carefully planning the timing and sequence of reservoir drawdown and dam removal.
- The Clark Fork River downstream of the Milltown Dam will be monitored during and after remediation. Monitoring will include daily water quality sampling and caged fish exposure studies, as well as seasonal or annual measurements of fish and benthic (bottom-dwelling) macroinvertebrates communities. Proposed monitoring programs are discussed in more detail in Section 12.5, *Monitoring*.

12.4.1 Volume of Sediments Released/Downstream Concentration of Copper, Arsenic, and TSS

Sediment scour modeling using conservative input assumptions was conducted to estimate the volume of scoured materials and the potential TSS, copper, and arsenic concentrations produced and transported as a result of the proposed Milltown cleanup. The modeling estimates that approximately 478,000 tons of additional sediment will be scoured from the reservoir during a 4-year construction period. In a comparison, approximately 148,000 tons of sediment presently move through the Milltown reservoir to be transported downstream in a typical year. During high flow years, the sediment load is significantly larger. For instance, in 1996, about 317,000 tons of sediment moved through the reservoir and in 1997, the volume increased to 445,000 tons (see Exhibit 2-32, *Annual Sediment Loads – Estimated Yield for Bypass versus Historic Long-Term Averages and Sediment Loads from High Flow Years*).

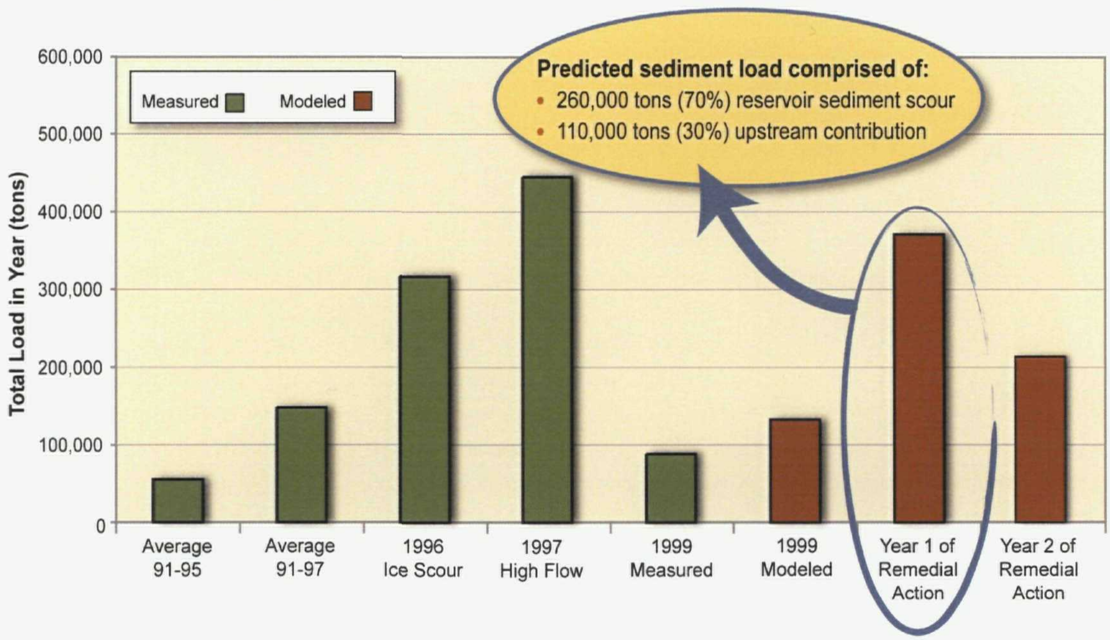

EXHIBIT 2-32
Annual Sediment Loads—Estimated Yield for Bypass versus Historic Long-Term Averages and Sediment Loads from High Flow Years

EPA believes that a temporary bypass channel for the Clark Fork River will prevent the scouring and subsequent transport downstream of the most highly contaminated sediments. Of the material that is scoured from the reservoir, slightly more than half will be uncontaminated sediments from the Blackfoot River and the rest from the Clark Fork River. The concentrations of metals from the Clark Fork arm of the reservoir are expected to be similar to what already comes down the Clark Fork each year. Nearly all (about 97 percent) of the sediment scouring would happen during the high flow seasons during the first 2 years of the remedial action.

According to modeling results, the concentration of dissolved metals in the Clark Fork River during construction should not be any higher than concentrations observed during normal high flow events. Dissolved metals concentrations in the river are not expected to exceed any of the temporary standards established for this project (see Exhibit 2-33, *MRSOU*

Proposed Temporary Construction Related Water Quality Standards). Peak dissolved copper and arsenic levels are expected to be about 23 μg/l and 14 μg/l, respectively. Of these concentrations, about 15 to 25 percent is expected to be from upstream loading. TSS concentrations may exceed the temporary standards for short periods of time, but are not expected to approach the construction standards after the high flow season following dam removal. Peak TSS concentrations are estimated to be about 1,850 mg/l. It is estimated that the daily maximum TSS standard (550 mg/l) will be exceeded for approximately 3 to 4 days during a 4-year construction period. The estimated ranges of total arsenic and copper concentrations are 3 to 35 μg/l and 5 to 205 μg/l, respectively.

A key technical issue during implementation of the selected remedy will be to control, contain, and prevent the release of sediment during removal activities in protection of downstream water quality and aquatic resources. The sediment management program that will be implemented considers OSWER Directive 9285.6-08, *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites.*

EXHIBIT 2-33
MRSOU Temporary Construction Related Water Quality Standards*

Cadmium—Acute FAWQC	2 μg/l	short-term (1 hour)
Copper—80% of the TRV (dissolved) (at hardness of 100 mg/l)	25 μg/l	short-term (1 hour)
Zinc—Acute FAWQC (dissolved)	117 μg/l	short-term (1 hour)
Lead—Acute FAWQC (dissolved) DWS (dissolved)	65 μg/l 15 μg/l	short-term (1 hour) long-term (30-day average)
Arsenic—Acute FAWQC (dissolved) DWS (dissolved)	340 μg/l 10 μg/l	short-term (1 hour) long-term (30-day average)
Iron—FAWQC (dissolved)	1,000 μg/l	short-term (1 hour)
Total Suspended Solids (TSS)	550 mg/l 170 mg/l 86 mg/l	short-term (day) mid-term (week) long-term (season)

*All hardness related FAWQC values assume a hardness of 100 mg/l
TRV = Toxicity Reference Value, used in *Proposed Plan* for the Clark Fork River Operable Unit
FAWQC = Federal Ambient Water Quality Criteria (Gold Book update 2002)
DWS = Federal Drinking Water Standard

An important part of the sediment management program will be to monitor the site during and after sediment remediation to assess and document the effectiveness of the cleanup. Water quality and biological studies will be conducted during and after site remediation activities to monitor for potential adverse effects on aquatic habitat and organisms. A water quality monitoring station will continuously monitor turbidity on the Clark Fork River downstream of the Milltown Dam Site at the Deer Creek Bridge. Total suspended solids and dissolved and total recoverable metals sampling will be conducted daily. EPA and DEQ have established temporary construction-related water quality standards (Exhibit 2-33, *MRSOU Proposed Temporary Construction Related Water Quality Standards*) that will be applied to the river during the construction process. The point of compliance for these standards is proposed at the Deer Creek Bridge, located about 2.8 miles downstream of Milltown Dam and the site of a current USGS sampling station (Station No. 12340500). Additional BMPs and control actions will be considered if these standards were exceeded or if in-situ bioassays (caged fish) indicated the need.

Biological monitoring will be conducted downstream of Milltown Dam and at control stations to assess whether or not cleanup activities may be affecting aquatic life. Caged-fish bioassays will be used to assess the protectiveness of the temporary construction standards, while seasonal or annual measurements of fish and benthic macroinvertebrate communities will be used to assess longer-term impacts. Results from these monitoring activities will be used to adjust construction activities, BMPs, or treatment if necessary, to avoid acute impacts on fish.

Construction BMPs will be employed to help prevent uncontrolled release of sediment into the river during construction activities. Examples may include building temporary berms along the banks of the active channel to prevent material spillage into the river by trucking activities, careful planning of spoils pile locations and dewatering activities, careful planning of egress and access to the site, employment of silt curtains downstream of the construction activities if needed, liberal use of hay bales in likely areas of potential runoff from rain events, and watering of roads and stockpile areas to reduce dust emissions.

12.4.2 Effects of Sediment Release

There is expected to be little or no effect on downstream aquatic life resulting from metals released during the cleanup. The release of high levels of TSS and sediments is likely to have a temporary negative impact on aquatic life downstream during implementation of the remedy. Adult trout have been shown to have high tolerances to high levels of TSS, but concentrations of TSS greater than 1,200 mg/l have been shown to cause some mortality in trout less than a year old. Longer term exposure to TSS concentrations between 100 and 1,000 mg/l have been shown to have chronic impacts on trout such as impaired feeding and reduced growth. Deposited sediment can also reduce fish spawning habitat and macroinvertebrate populations (fish food supplies), and thereby impacting fish reproduction, growth and population. The sediment scour modeling effort indicated that the fine materials (silts, clays, and organic matter; about 50 percent of the total release) will move through the system very quickly. Maximum impacts will be observed from immediately below the Milltown Dam to the junction of the Clark Fork and Bitterroot Rivers. Impacts of sand and fine material moving downstream become less and less as more water enters the river. The flow of the Clark Fork River below the Bitterroot River is twice as great as the flow of the Clark Fork River leaving the Milltown Reservoir and seven times greater by the time the Clark Fork River reaches Thompson Falls Reservoir.

Drinking water supplies should not be polluted in any way by the cleanup. To the contrary, the cleanup will result in a restored drinking water aquifer for Milltown. EPA and DEQ are confident that drinking water supplies will not be impacted by the cleanup because the levels of metals and arsenic in any released sediments are expected to be low. In addition, there are no drinking water system intakes drawing water directly from the river.

Downstream irrigation systems may be impacted, namely those withdrawing water between the Milltown Dam and the Bitterroot River. The main impact is expected to be from sand accumulating at the intakes and constricting intake flows.

There should be very little impact on infrastructure from sediment accumulation downstream of the I-90 bridge immediately below Milltown other than at the irrigation intakes. This is because of the higher river velocity between Milltown Dam and Thompson Falls Reservoir. Most of the fine sediments and sand will accumulate in the Thompson Falls Reservoir (some fines may go through Thompson Falls Reservoir into Noxon Reservoir). The amounts of sediment that will be transported to the downstream reservoirs as a result of construction activities at Milltown will be relatively small as compared to the amount routinely transported. An estimated 478,000 tons of additional sediment will be transported from the Milltown Reservoir during a 4-year construction period as compared to an estimated 2,200,000 tons of sediment transported from upstream to Thompson Falls Reservoir during a typical 4-year period. Given the large amounts of sediment routinely deposited in these reservoirs and the low levels of metals in the released Milltown sediments, there should be little to no impact on overall sediment metals levels, groundwater quality adjacent to these reservoirs, or reservoir storage capacity.

12.4.3 Controls and Mitigation Measures

Several key engineering controls and construction BMPs will be used to minimize the scour and release of reservoir channel sediment and associated metals during construction activities to protect downstream water quality.

The major planned engineering controls include the isolation of the Area 1 sediments using a sheet pile and bypass channel system (see Exhibit 2-27, *Construction of Bypass Channel and Location of Construction Facilities*). This system should be highly effective in reducing the potential sediment scouring. This system reduces total scouring from about 1.2 million tons of sediment to about 478,000 tons and reduces the amount of highly contaminated sediment (greater than 1000 mg/kg copper or greater than 100 mg/kg arsenic) scoured from the reservoir from an estimated 400,000 tons to 0 tons. Additional BMPs (such as silt curtains, coffer dams, and grading and armoring of bypass stream banks) will be developed in detail during remedial cleanup design and construction.

Another important aspect of mitigating and reducing potential downstream impacts is the timing and sequencing of reservoir drawdown and dam removal. To minimize downstream impacts and allow the earliest possible fish passage and recovery, EPA and DEQ propose dam removal during the winter and spring months immediately after the Area-1 sediments are isolated and the Clark Fork River is routed into the bypass channel. By timing the reservoir drawdown and dam removal in late winter/early spring, most sediment would be scoured during spring run-off and before the major irrigation withdrawals and the summer/early fall recreational season. There is also a potential for intake gate elevation control to try to bypass the sand fraction past irrigation intakes. Excavation equipment will also be dedicated to ensure that gates are not constricted by sand deposition. EPA and DEQ will require the party implementing the remedial action to work closely with irrigators to insure that negative impacts are minimized.

12.5 Monitoring

An important part of the cleanup remedy is the monitoring program during and after remediation. Monitoring will assess and document the effectiveness of the cleanup. The monitoring program will include a variety of media, aquatic life, and flora, including surface and groundwater water quality and biological studies conducted during and after site remediation activities to assess any adverse effects on aquatic habitat and organisms. Monitoring of repositories, engineered control structures, such as the Area 3 sediments left in place, and the lower I-90 embankment is also required.

Another facet to the proposed monitoring programs involves the restoration activities of the State and other Natural Resource Trustees. EPA has worked with the State and other Trustees to provide close coordination between the remediation and restoration plans within the remediation project area (the area from the dam to Duck Bridge on the Clark Fork River arm of the reservoir and to the Interstate Bridge on the Blackfoot River arm). This cooperation and integration will also extend to the monitoring programs.

12.5.1 Surface Water Monitoring

The primary surface water quality monitoring station and point of compliance downstream of Milltown Reservoir is a long term USGS monitoring station with 75 years of record ("Clark Fork River above Missoula," at the Deer Creek Bridge, USGS Station No. 12340500). The Deer Creek Bridge is located approximately 2.8 miles downstream of Milltown Dam. No other tributaries enter the Clark Fork River between the dam and this gaging station. This monitoring point will allow direct comparison to historic levels. Recharge from groundwater back into the river will be monitored through an existing network of wells (see Section 12.7, *Performance Standards and Remedial Goals*).

Monitoring during implementation of the remedy will include the following:

1. Continuous monitoring of turbidity on the Clark Fork River downstream of the Milltown Dam Site at the Deer Creek Bridge.
2. Daily sampling of TSS and dissolved and total recoverable arsenic, cadmium, copper, lead, and zinc.
3. Periodic sampling of TSS, metals, and arsenic will occur downstream at a predetermined location immediately upstream of Thompson Falls Reservoir. The exact location and frequency will be determined during remedial design.

In addition, EPA and DEQ have also established temporary construction standards (see Exhibit 2-33, *MRSOU Temporary Construction Related Water Quality Standards*) for the river to protect human health and prevent acute impacts to the downstream fishery, including bull trout. Additional BMPs and control actions will be considered if these standards are exceeded.

Seasonal or annual measurements of fish and benthic macroinvertebrate communities and caged fish studies will be used to assess longer-term impacts. Results from these monitoring activities will be used to adjust construction activities or BMPs to avoid acute impacts on fish.

12.5.2 Groundwater Monitoring

In addition to the surface water quality monitoring, groundwater quality in the Milltown area and at key downstream locations will be monitored. Although negative impacts to groundwater used for drinking water are not expected, EPA is committed to remedy any problems related to drinking water that might occur.

Atlantic Richfield Company, through their contractor Land & Water, presently monitors water quality in an extensive network of potable water wells and monitoring wells strategically located throughout the valley (see Exhibit 2-16, *Land Use and Future Water Needs Analysis Area*). Water levels and water quality (arsenic, cadmium, copper, lead, and zinc) are monitored on a quarterly basis. Monitoring of this network will extend through construction and into the post construction period to document impacts and the rate of change to both water table elevations and water quality.

During the construction period when the reservoir is being drawn down and the dams are removed, water levels in the monitoring network will be monitored more frequently to capture and record any changes in groundwater elevation and flow direction.

The specific frequency of monitoring will be determined during remedial design when the construction schedule for remedial activities is confirmed and set. Additional monitoring wells may be added to the network to fill unanticipated data gaps and make the groundwater monitoring as comprehensive as possible. The specific locations of any new wells will be determined during remedial design.

12.5.3 Operational and Functional Monitoring

The results of remedial/restoration actions are to be evaluated during the post-construction period, and during the first, second, and third growing season, to rapidly determine if the re-vegetation component of the remedy is operational and functional and to trigger corrective actions immediately as problems are encountered. Because of the extensive restoration activities applied to the project area, the State of Montana has agreed to lead certain aspects of the operational and functional monitoring. During remedial design, as a precursor to construction implementation, re-vegetation targets will be established for the new flood plain areas, river banks, and other areas impacted by construction activities (e.g., soil borrow area, temporary access roads, etc.), specifically for the following:

- Streambank and flood plain stability against accelerated erosion.
- Established and fully functional riparian and flood plain areas, including species diversity.

It is reasonable to expect attainment of these targets during the third growing season, although recurrent drought cycles may extend this period. To ascertain flood plain stability and determine whether vegetation is on a trajectory to attain the performance targets, the following assessments are to be made following implementation of remedial action:

- General flood plain stability—Evidence of rills and gullies; soil movement or mass instability will trigger corrective actions.
- Streambank stability—Assessments of the banks are to be conducted. Evidence of erosion along the toe or erosion at either the upper or lower ends of the treated banks will trigger corrective actions.
- Assessment of woody vegetation survival will be conducted of the original planted materials by species. Corrective actions may include replanting to the original number of plants for a particular species.

- The goal for herbaceous vegetation in the flood plain and riparian zone is 98 percent canopy cover of the seeded area. Corrective actions may include determining cause(s) for failure, correcting them, and reseeding.

Noxious weeds and undesirable weedy species are to be controlled in accordance with County regulations.

12.5.4 Short-Term Monitoring

Following demonstration that the remedy is operational and functional, the site will be monitored for a period of at least 5 years. The short-term performance phase will demonstrate the immediate success of the remedy in terms of streambank stabilization and preferred vegetation establishment in the flood plain. In addition to the vegetation cover, species richness, weed control, and flood plain stability conditions required under operational and functional, the short-term performance monitoring phase will include broader evaluations of ecological trend.

This level of monitoring will be conducted after remedial action(s) are implemented, and results will be used to determine whether the action remains operational and functional. This level includes baseline measurements of groundwater and surface water, qualitative assessments of the remedial action, and failure assessments. Specific short-term monitoring plans will be prepared during the remedial design phase of the project.

12.5.5 Long-Term Monitoring

Specific areas will be subjected to long-term monitoring after short-term monitoring, which may include the assessment of temporal changes using qualitative and quantitative assessments. These data and information are used to assess whether the Selected Remedy has been implemented and whether vegetation targets are met. This period of monitoring is generally 6 to 20 years depending on the time required to achieve operational and functional status, changes in land use, and any on-going maintenance activities.

All of the abiotic and biotic monitoring—including plant communities, growth media, erosional stability, aquatic communities, evidence of sustainability, and wildlife—will play significant roles in the assessments of achievement of ecological and health risk reduction and assessment of meeting ARARs. Specific long-term monitoring plans will be prepared during the remedial design/remedial action phase of the project.

12.6 Additional Selected Remedy Considerations

12.6.1 Replacement Water Supply Program/Temporary Groundwater ICs

EPA is aware that some temporary groundwater ICs may be necessary during and immediately after construction to address potential human health risks by limiting the use of the groundwater until the aquifer recovers through natural attenuation. Groundwater ICs to be implemented throughout the 4- to 10-year attenuation period include the following:

- Provide continued funding for maintaining the existing replacement water supply for Milltown residents.

- Make contingency funds available to reconfigure, expand, or update replacement water supplies.
- Establish a controlled groundwater area to ban future wells within or immediately adjacent to the arsenic plume.

Several ICs are already in effect, routinely enforced, and currently contribute to the protection of public health and the environment. These controls include the following:

- Missoula County land use plans
- Flood plain and subdivision regulations
- Zoning
- County development regulations for utility service extensions
- Missoula Valley Aquifer Protection Ordinance—Controls well use in the county as well as private land use controls

Some of these, or similar controls, may need to be developed or refined to promote proper land use where wastes are left in place.

12.6.2 Compliance with the ESA

Bull trout and bald eagle are both listed as threatened species and occur in or near the site. Construction activities should have minimal impact on bald eagles in the area, but bull trout may be impacted by site activities. To minimize the impact on bull trout, construction methods proposed during implementation of this remedy include use of a sheet pile system and construction of a bypass channel to minimize TSS and metals release. Activities will also be timed and sequenced to minimize impacts. EPA will coordinate and conduct cleanup activities in a manner that will facilitate fish passage as soon as possible. In the long term, it is considered beneficial to fishes to implement cleanup and dam removal quickly and in an environmentally safe manner.

Although extensive mitigation methods are proposed, there is a potential that short-term adverse impacts to bull trout could occur as a result of construction activities. Adverse impacts could reach the level at which incidental take of bull trout could result. The USFWS has worked with the EPA on the development of measures to reduce impacts of this project on fish and wildlife. The EPA prepared a revised biological assessment, describing potential impacts of this cleanup with mitigation measures to minimize impacts to fish and wildlife. This document was submitted to the USFWS for incorporation into their Biological Opinion. The USFWS Biological Opinion has been completed in support of the Milltown Project, is available for review as a separate document (USFWS 2004) and is part of the administrative record.

12.6.3 Stimson Dam Removal

As previously described in discussion of the remedy, another necessary action, coordinated with the State's restoration plan and the remedial action, is the removal of the Stimson Dam located on the Blackfoot River, a mile upstream of the Milltown Dam. Although not specifically a remediation element of the project, EPA, DEQ, and the Trustees have determined that the removal of this dam is necessary to provide fish passage and eliminate physical hazards that would occur from the lower water level once the Milltown Dam is removed. Currently, plans call for removal of the Stimson Dam. This would occur with funding from the USFWS National Fish Passage Program, matching funds, and other contributions. The removal of the Stimson Dam would occur immediately prior to the removal of the Milltown Dam.

12.6.4 Other Selected Remedy provisions

Significant wetlands exist at the MRSOU. EPA has previously worked with the USFWS on a methodology for assessing wetlands in the Clark Fork River Basin prior to construction activities, and ensuring that a no net loss of wetland standard is achieved. This important ARAR requirement will be complied with for the MRSOU. Existing wetlands will be carefully mapped and scored, and the wetlands destroyed during the remedy implementation will be replaced within the Clark Fork River Basin. The implementation of the DCRP within the Project Area may offer significant opportunity for the development of riparian wetlands as replacement wetlands.

The Milltown Dam facility is potentially eligible for protection under the National Historic Preservation Act. There are other potentially eligible historical or cultural resources within the MRSOU. EPA will work with FERC, the State Historic Preservation Office, and the CSKT to ensure that the destruction of protected historical and cultural resources is avoided if possible, appropriate mitigation is conducted for resources lost as a result of the Milltown cleanup, and careful protection of any newly discovered protected resources as the project is implemented.

As noted in various sections above, this *Record of Decision* requires the protection of groundwater users. EPA does not expect contamination to expand or spread during remedy implementation. However, if it does, contingency plans will be in place to address wells that may be temporarily affected by the implementation of the Selected Remedy. The Selected Remedy also requires a response to current domestic wells that have been adversely affected by the expected drop in ground water levels as a result of dam removal. EPA will also ensure that downstream users of irrigation ditches and similar structures are protected from adverse effects of sediment release during remedial construction.

12.6.5 FERC License Surrender

The dam owner, NorthWestern Corporation, plans to submit the plans and agreements to implement the combined remediation and restoration plan for the Milltown site to FERC. FERC has issued NorthWestern Corporation, via its subsidiary, a license for operation of the dam. The combined plan should comply with FERC dam license surrender and de-commissioning requirements, if applicable. Section 121(e)(6) of CERCLA exempts CERCLA remediation projects from permits or licenses. EPA, NorthWestern Corporation, and FERC have worked cooperatively on this project.

12.7 Performance Standards and Remedial Goals

This section of the *Record of Decision* describes and discusses key performance standards for groundwater, surface water, and vegetation. Performance standards are also contained in Appendix A of the *Record of Decision* — the description of ARARs.

12.7.1 Performance Standards for Groundwater

The groundwater RAOs are as follows:

- Return contaminated groundwater in the Milltown alluvial aquifer to its beneficial use within a reasonable time frame.
- Comply with State and Federal groundwater standards, including nondegradation standards.
- Prevent groundwater discharge containing arsenic and metals that would degrade surface waters.

Implementation of the Selected Remedy will accomplish these objectives. The Selected Remedy must be compliant with groundwater ARARs as established for the MRSOU. Standards for groundwater are as follows (dissolved concentrations):

- Arsenic 10 μg/l
- Cadmium 5 μg/l
- Copper 1,300 μg/l
- Lead 15 μg/l
- Zinc 2,000 μg/l

Methods to evaluate groundwater performance standards, points of compliance, monitoring well locations and numbers, frequency of sampling and analysis, and reporting requirements are to be specified in remedial action monitoring and maintenance plans. EPA expects the Selected Remedy to obtain these standards within 4 to 10 years after construction is completed in areas where production rates are suitable for water supply purposes. However, EPA recognizes that there is uncertainty about how quickly the Selected Remedy will achieve full compliance with these Performance Standards in the Milltown alluvial aquifer. If full compliance is not achieved, EPA will consider other options to meet this standard, or, if warranted, invoke appropriate waivers of these standards. Timing of evaluations relates to the determination of when the remedy becomes operational and functional, and other monitoring and maintenance requirements. EPA also recognizes that there may be limited areas where sediments are left in place and pore water within these sediments exceeds groundwater standards. These areas would not contribute significant amounts of contamination to the underlying aquifer.

12.7.2 Performance Standards for Surface Water

Final standards for surface waters provided in Exhibit 2-34 are based on a hardness of 100 mg/l using a total recoverable method, except for the copper standards and the arsenic and cadmium human health standard. The copper and the Federal human health arsenic and cadmium standards are based on the dissolved component.

Methods to evaluate surface water performance standards, points of compliance, sample locations, frequency of sampling and analysis, and reporting requirements are to be specified in the Remedial Design documents. Timing of evaluations relates to the determination of when the remedy becomes operational and functional, and other monitoring and maintenance requirements as described below.

EXHIBIT 2-34
Surface Water Standards[a]

	Acute	Chronic	Human Health
Arsenic	340 µg/l	150 µg/l	10/18 µg/l[b]
Cadmium	2.10 µg/l	0.27 µg/l	5 µg/l[c]
Copper[d]	13 µg/l	9 µg/l	1,300 µg/l
Lead	81 µg/l	3.2 µg/l	15 µg/l
Zinc	119 µg/l	119 µg/l	2,000 µg/l

[a] Based on 100 mg/l hardness, total recoverable, acute, and chronic (WQB-7, January 2004, unless otherwise noted)

[b] The performance standard includes both the federal MCL, 10 µg/l, dissolved and the State WQB-7 standard, 18 µg/l, based on total recoverable analysis. Final determination of whether these standards will be consistently attained will depend upon upstream source control as well as implementation of this remedy.

[c] Performance standard based on the Federal and State MCL, measured as a dissolved standard.

[d] Federal Ambient Water Quality Criteria (dissolved; Gold Book, update 2002)

12.7.2.1 Temporary Surface Water Quality Standards

EPA has invoked a waiver of the ambient surface water standards during construction activities pursuant to section 121(d)(4)(A) of CERCLA, 42 USC § 9621 (d)(4)(A), which allows waivers for interim measures. The waiver applies to the ambient surface water standards for cadmium, copper, zinc, lead, arsenic, iron, and total suspended solids. As discussed in Section 12.4, *Control of Sediment Releases During Construction*, EPA has determined that exceeding these ambient surface water standards during construction activities is unavoidable. However, the construction activities are temporary, interim measures implemented as part of the total remedial action for the purpose of attaining the ARARs when completed. As set forth in Appendix A, the final remedial action will attain the ambient surface water standards with the exception of copper. Copper exceedances resulting from upstream sources are discussed in Appendix A.

Exhibit 2-33, *MRSOU Proposed Temporary Construction Related Water Quality Standards*, lists the temporary surface water quality standards to be used during the construction (both remedial action and restoration) and implementation portion of the project. These temporary standards were established by EPA and DEQ, in consultation with FWP, to protect human health and prevent acute impacts to the downstream fishery, including bull trout. Reference to these standards during remedy implementation needs to consider whether an exceedance of temporary standards is related to construction activities at the MRSOU or to loading from upstream or other sources. Neither remedial action nor restoration may contribute to an exceedance of the temporary surface water quality standards. The construction standards apply to both ambient surface water and point source discharges created during the remedial action or restoration construction.

12.7.3 Specifications for Backfill and Growth Media

Specifications for backfill and growth media will be developed and approved during the remedial design process. The growth media may be obtained onsite or from adjacent borrow areas when appropriate specifications are met. The backfill will be obtained from the BDG and Sheriff's Posse borrow areas. The objectives for the backfill specifications are to allow the establishment of a stable naturally migrating channel, in compliance with Performance Standards including ARARs, and to prevent excessive erosion and downstream transport of flood plain materials. The objective for the growth media is to provide adequate plant cover, in compliance with Performance Standards including ARARs, to prevent excessive erosion and subsequent potential negative impacts on water quality and aquatic life.

12.7.4 Performance Standards for the Protection of Waste Left In Place and Local Repositories

Sediments left in place and existing and newly created repositories will be protected through planning and construction design to ensure the following:

- Existing local waste repositories and newly created debris repositories will remain out of the 100-year flood plain. Remedial design of the new channel and the adjacent flood plain will accommodate this requirement.
- Milltown Reservoir sediments containing elevated levels of metals in Area 3 not removed by the remedial activities or left in place adjacent to I-90 will be isolated from the flood plain and protected from erosion by adequate slope and toe protection. Remedial design considerations for such areas will be able to withstand a 100-year flood event without significant soil losses resulting from erosion.

12.7.5 Performance Standards for the New Channel

Specific performance standards for the new channel will be developed in detail during the final design. Draft conceptual standards are presented in the State's DCRP. General requirements include the following:

- The active channel will be designed to accommodate the bankfull discharge with an adequately vegetated flood plain to convey flood flows of higher magnitude (such as a 100-year, 24-hour event). Channel plan view geometry and characteristics (sinuosity, meander length range, curvature radii, and step frequency) will reflect bank full discharge needs and mimic characteristics of similar reference reaches.
- Channel dimensions (including depth, slope, roughness, cross-sectional area, and width/depth ratio) will be designed to meet the specific features of the reach in which they reside. The State's restoration plan has designated these areas as Clark Fork River sections 1, 2, and 3, and Blackfoot River section 1.
- Riffle, pool, run, and glide features will be incorporated into the design to efficiently dissipate water energy, sustain a gradient that maintains sediment entrainment through the project area, and provide for adequate deep pool habitat for aquatic life (fish).
- The final design shall promote the passage of adult and juvenile salmonids and other fish without restriction during periods of low flow through all discharge periods.

These standards apply to the Restoration action within the Project Area, which is being done in lieu of certain remedial actions.

12.7.6 Performance Standards for Re-Vegetation of River Banks and the Flood Plain

Performance standards for vegetation are to be integrated into remedial and restoration design, as appropriate, based primarily on end land use. The use of native species for revegetation will be emphasized within the flood plain. Vegetation performance measurements endpoints include, but are not limited to, the following:

- Woody browse levels
- Completeness of the canopy along the streambank and riparian area
- Vegetation cover
- Species richness
- Vegetation structural complexity
- Maturation periods
- Plant reproduction
- Species diversity

The re-vegetation performance standards measurement endpoints will be further developed as land management objectives for the project area are developed. For instance, wildlife would favor good habitat value associated with structurally complex vegetation and species diversity. The degree to which the remedy is able to satisfy the objectives of the land managers is dependent on the management objectives for the project area. Native vegetation—such as grasses, shrubs, and trees—will be specified for many areas that will receive remedial actions. For other areas, the vegetation community to be established will depend on current land use and condition. For example, in many riparian plant communities, greater diversity means earlier seral, disturbed conditions. Some healthy, natural communities are monocultures (such as common cattail or sedge stands).

Methods to evaluate soil and vegetation performance standards are to be provided in remedial action and restoration construction quality assurance plans and in remedial action and restoration monitoring and maintenance plans. Assessment areas or points of compliance are to be determined on a polygon-by-polygon basis. Timing of evaluations relates to the determination of when the remedy or restoration becomes operational and functional, and other monitoring and maintenance requirements.

The performance of remedial efforts to reach minimum standards in terms of survival of plantings, vegetation composition, and canopy cover on areas within the 100-year flood plain will be assessed on a polygon-by-polygon basis. Performance standards and guidelines will be written to assure the achievement of ultimate targets at 10 years from initial remedial or restoration treatment. Interim targets at intervals of 1, 2, 4, and 7 years from initial remedial or restoration treatment are typically designated as checkpoints to assess that progress is being made along a trajectory that will reach the ultimate performance standard after 10 years.

12.7.7 Compliance with ESA During Construction

The minimization methods for sediment control proposed during construction of this remedy include the following:

- Construction of a bypass channel to isolate Area 1 sediment from entrainment in river flow.
- Use of a cofferdam, sheet pile, or silt curtain system to isolate and control sediment and metals release.
- Other BMPs such as controlling reservoir pool level (until the dam is removed) to minimize scouring, and timing and sequencing activities to minimize impacts.

EPA will coordinate and conduct cleanup activities in consultation with USFWS to facilitate fish passage while the dam is in place. In the long term, it is considered beneficial to fishes to implement cleanup and dam removal quickly and in an environmentally safe manner. Therefore, time sensitive actions related to cleanup and dam removal may hold priority over fish passage needs. Even though extensive minimization methods are proposed, there is still a chance that bull trout will be negatively impacted by the construction. The USFWS Biological Opinion contains requirements for ESA compliance, which are applicable to the remediation project, the restoration implementation, the interim dam operation, and the Stimson Dam removal, respectively (USFWS 2004).

12.7.8 Performance Evaluations for the Selected Remedy

Following completion of the Selected Remedy, a need will exist to maintain the remedy, including restoration actions done in lieu of remedial action, and demonstrate that the remedy is operational and functional, and ultimately that the remedy is successful. A Monitoring and Maintenance Plan is to be developed and is to include assessments of the success of the Selected Remedy by evaluating the following:

- Improvements in groundwater quality compared to Performance Standards for multiple points of compliance over a reasonable time period.
- Reduction of acute and chronic risks to aquatics as measured by biological surveys of fish densities, and benthic macroinvertebrate taxa richness and species diversity counts.
- A measure of vegetation attributes of cover, production, species richness, and successional trend across the reconstructed flood plain.
- Assessments of meeting Performance Standards established in this *Record of Decision*, including ARARs.

12.7.9 Safety Concerns

Conducting a cleanup in a safe manner is a primary concern. Safety will be stressed throughout all aspects of the project. Other sections of the *Record of Decision* elaborate on why it is necessary to remove some of the most toxic sediments. EPA's experience with other sites where large scale removal has been done indicates this project can be conducted safely with careful planning.

Comments on both *Proposed Plans* specifically discussed the potential for inhalation of contaminated dust from construction activities. A concern regarding inhalation is contrary to the findings of the *Human Health Risk Assessment*, which did not find the inhalation pathway for contaminants associated with disturbance to be a problem. It is also contrary to experience at other sites (Warm Springs Ponds, LAO, Butte Hill, and Silver Bow Creek) where dust control during removal of wastes has been appropriately implemented and no adverse health effects have been suggested or demonstrated.

The safety risks posed by removing and hauling sediment to a secure rail car loading dock can be controlled and managed. Past cleanup actions in the Clark Fork Basin have generally demonstrated this. However, it does require a high level of safety consciousness, good planning, and a commitment to coordination and cooperation with local county and city officials and residents. In 17 years of cleanup construction valued at hundreds of millions of dollars and involving the removal of millions of cubic yards of wastes in the Clark Fork Basin, there has been one construction worker fatality and very few other injuries, but no injuries to the public.

A primary consideration at the MRSOU project is to manage haul trucks safely. This includes planning to safely optimize truck traffic flows on major highways, primary local county roads, and secondary access roads onto private property. EPA has consulted with construction specialists at the U.S. Bureau of Reclamation and with EPA's contractor, and believes that the project can be designed and implemented in a safe manner. Other large scale construction projects, such as road construction and logging operations, commonly pose traffic safety risks and yet are effectively planned and implemented.

EPA will emphasize project safety in implementation. This particular project will require possible road paving and widening, the coordination of rail car hauling of wastes to the Opportunity Ponds repository, and other techniques to minimize public contact with the trucks, trains, and heavy equipment, and to ensure wide and stable enough roads where that contact may occur. The remedy will retain responsibility for road upgrades and EPA will work closely with local representatives. EPA believes the remedy can be safely implemented through good planning and engineering practices.

12.8 Scheduling

The potential schedule for implementation of the proposed remedy is summarized below. This schedule is likely to change based on public participation activities, final design components and sequencing, and yearly variations in hydrologic conditions.

2004	*Record of Decision*
2004 - 2005	Planning/Remedial Design
2004 - 2005	FERC License Surrender Regulatory Activities
2005	Infrastructure Construction (sheet pile, bypass channel, rail spurs, etc.)
2006	Dam Removal (Remediation and Restoration elements)
2006 - 2007	Sediment Removal, Backfilling, Regrading
2007 - 2008	Channel Stabilization and Revegetation Activities (Restoration)
2009 - Future	Redevelopment Activities
2009 - Future	Operation and Maintenance and 5-year reviews

12.9 Cost Estimate for the Selected Remedy

A cost estimate was prepared by the USACE based on EPA's selection of a final remedy for the MRSOU. Previous cost estimates were developed by Atlantic Richfield Company and their contractors to evaluate potential alternatives for the cleanup of this site (*Draft Combined Feasibility Study*, 2001; and *Draft Sediment/Dam Removal Cost Estimate Report Milltown Reservoir Site*, Atlantic Richfield Company/EMC^2, June 2002 and its addendum in July 2002). The cost estimate presented here uses the cost information from those previous efforts and modifies it for the current remedy, which consists of 100 percent mechanical excavation of sediments with 40 percent requiring dewatering and 100 percent of the material going to Opportunity Ponds with no costs associated with the unloading and redistribution of the wastes at the repository. Further modifications include a rail/haul road bridge, changing sheet pile design and quantities, inclusion of a drop structure, construction of a dike across the existing channel of the Clark Fork River, and installation of a bypass channel.

Total Estimated Construction Costs for the project were prepared after sufficient detail was developed for the key components of the cost breakdown structure. Total Construction Costs are defined as Capital Costs of various defined categories, plus Miscellaneous Costs, which includes such items as design engineering cost, contractor mobilization/ demobilization costs, contractor profit, construction management costs, etc.

In terms of schedule, this is an EPA directed superfund cleanup incorporating the surrender of a FERC license. The construction periods are assumed to be based on four typical construction work seasons for western Montana (March through December). The Milltown Dam presently acts as a barrier to the migration of fish up and down the river, and it was assumed that the annual construction period would not be altered (for the duration of the project) to accommodate the passage of migrating fish.

Capital costs for the project are estimated at $139,500,000. The net present value (NPV) for these estimated project costs (discounted by 3 percent per year for the estimated life of the project) is $106,000,000. It should be noted these costs assume that the project is implemented by EPA and the USACE and include a contingency of 15 to 20 percent. The actual cost of implementation by RPs with no contingency may be significantly lower.

The information in this cost estimate section is based on the best available information regarding the anticipated scope of the Selected Remedy. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the Selected Remedy. Major changes may be documented in the form of a memorandum to the Administrative Record file, an Explanation of Significant Differences, or *Record of Decision* amendment.

12.10 Expected Outcomes of the Selected Remedy

Exhibit 2-35 presents a summary of the anticipated outcomes of the Selected Remedy by river reach with regards to land use, groundwater use, and human and ecological risk reduction as a result of the response action.

EXHIBIT 2-35
Expected Outcomes for the Selected Remedy

Site Scenario	Exposure Controlled Through Treatment, Off-site Disposal of Source Material, and ICs
Land use and time frame	The land use is expected to focus on open space preservation, recreational activities, and wildlife habitat. No permanent structures may be placed in the 100-year floodway. The entire reservoir basin and flat lands south of 1-90 are located in the floodway, as are other areas adjacent to the Blackfoot and Clark Fork rivers. If the land use immediately surrounding the reservoir changed to residential, human health risks would be unacceptable, but this use is not considered likely because of the floodway regulations. Additional ICs will be put in place, if necessary, to ensure that there is no residential use of areas that exceed risk-based levels. The MRSOU is expected to be re-opened for recreational uses, such as hiking, birdwatching, and fishing, following construction.
Groundwater use and time frame	The Milltown aquifer is expected to recover through natural attenuation. The use is expected to be restored approximately 4 to 10 years after dam removal and construction completion. The replacement water supply program and implementation of temporary groundwater ICs will be continued to protect human health until the recovery of the aquifer is complete. Groundwater performance standards are described in detail in Section 12.7.1 of this *Record of Decision*.
Anticipated socio-economic and community revitalization impacts	The design and construction of the Selected Remedy is expected to boost the local economy. Although some members of the public expressed concern that the loss of Milltown Dam would have negative tax impacts for Bonner School, the restoration of the confluence is expected to greatly improve the fishery and attract more tourism dollars to the area. The degraded groundwater quality has limited economic development in Bonner and adjacent areas. Restoration of the aquifer would eliminate this development limitation. Under the Selected Remedy, a waste repository will not be constructed at Bandman Flats, which allows use of that site for residential, recreational, or commercial development.
Anticipated environmental and ecological benefits:	
Ecosystem restoration	The Blackfoot and Clark Fork Rivers will be restored to a free-flowing confluence. The Clark Fork River channel will be designed to provide a natural appearance with meander bends across the flood plain. Removal of the entire dam—including the powerhouse, divider block, and right abutment—allows for a wider, more natural channel and flood plain. Final surface water performance standards are described in Section 12.7.2 of this *Record of Decision*.
Endangered species	Removal of both the Milltown and Stimson dams will provide passage for bull trout, a Federally listed threatened species. Temporary construction standards are designed to protect human health and prevent acute impacts to the downstream fishery and bull trout. The anticipated outcome is that the natural flood plain and channel design will benefit fish in the long term.
Wetland and wildlife habitat preservation	Any wetlands lost by removing Milltown Reservoir will be replaced according to valuation methods developed by the USFWS. EPA expects that wetlands will be created through the construction of riparian areas adjacent to the new channel and off channel wetlands within the 100-year flood plain. The created wetlands will have to match the functional value of the destroyed wetlands, or, if that does not occur, additional wetlands will be developed. This will preserve and enhance wildlife habitat in the MRSOU.

Cleanup levels or media-specific Performance Standards are described in detail throughout this *Record of Decision*.

13 Statutory Determinations

The Selected Remedy described in this *Record of Decision* meets the statutory requirements of section 121 of CERCLA, 42 U.S.C. § 9621, and NCP section 300.430(f)(5)(ii). These provisions require that CERCLA remedies be protective of human health and the environment, comply with ARARs or replacement standards for waived requirements, be cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the Selected Remedy meets these statutory requirements.

13.1 Protection of Human Health and the Environment

The Selected Remedy protects risks to human health identified in EPA's *Human Health Risk Assessment* (EPA 1993b) by selecting a remedial action that is highly likely to achieve groundwater RAOs and performance standards within a reasonable period of time. Implementation of the Selected Remedy will return contaminated groundwater to its beneficial use as drinking water within a reasonable timeframe. The Selected Remedy will also comply with State standards (WQB-7) for groundwater, as well as prevent discharge of metals-contaminated groundwater to surface waters.

The Selected Remedy will address environmental risks to surface water described in this *Record of Decision*. First, it will control, contain, and prevent the release of sediment during removal activities to protect downstream water quality and aquatic resources. An important part of the sediment management program will be to monitor the site during and after remediation to document the effectiveness of the cleanup. EPA and DEQ have established temporary construction standards to protect human health and prevent acute impacts to the downstream fishery and bull trout. Additional BMPs and control actions would be considered if these standards were to be exceeded. Second and importantly, it will eliminate the long-term risks to aquatic receptors from high flow, ice scour, and catastrophic release events by removing the aging Milltown Dam and the worst of the contaminated sediments, and controlling the remaining of the sediments.

The Selected Remedy does not produce unacceptable short term risks. Such risks as worker safety, community safety from truck traffic and contaminant release, land use interference, and flood plain stability and run-off during construction can be readily controlled through careful planning. In addition, no adverse cross-media impacts are expected from the Selected Remedy.

13.2 Compliance with ARARs

The ARARs and replacement standards for this site that the Selected Remedy must comply with are identified in detail in Appendix A to the *Record of Decision*. Key ARAR requirements and other Performance Standards for the site are described in Section 12.7, *Performance Standards and Remedial Goals*, of this *Record of Decision*.

Other criteria, advisories, or guidance to be considered during remedial design for this action are also identified in Appendix A, ARARs.

EPA has invoked the ARAR waiver of section 121(d)(4)(A) of CERCLA for this site, for surface water quality ARARs during construction. Replacement standards, and the basis for those standards are contained in Appendix A, and described in Section 12.7 of this *Record of Decision*. Appendix A also describes EPA's recognition that upstream surface water quality impacts the surface water at the MRSOU, and, accordingly, the final surface water quality standards for copper will reflect the standards established for the upstream operable unit—the Clark Fork River operable unit. Appendix A also acknowledges that the arsenic standard for the Clark Fork River OU may not be met at that site, and may be waived in the future under the Clark Fork River OU *Record of Decision*. That waiver, if granted, would also carry over into the MRSOU.

13.3 Cost Effectiveness

In EPA's judgment, the Selected Remedy is cost-effective. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness" [NCP § 300.430(f)(1)(ii)(D)]. This was accomplished by evaluating the overall effectiveness of the Selected Remedy and comparing that effectiveness to the overall costs. Overall effectiveness was evaluated by examining how the Selected Remedy meets three of the balancing criteria in combination—long term effectiveness and permanence, reduction in toxicity, mobility, and volume; and short-term effectiveness. The relationship of the overall effectiveness of the Selected Remedy was determined to be proportional to its costs.

The Selected Remedy provides significant long term effectiveness and permanence by removing the need for long term dam maintenance and ICs at the site, and removing the primary waste and principal threat from the flood plain. It also provides reductions in mobility and volume by removing the primary waste and principal threat from the flood plain where it could be moved during flood events to a secure location. The Selected Remedy provides for compliance with ground water RAOs within a reasonable period of time, which meets one of the sub-criteria under short-term effectiveness. It also provides for assurances that surface water RAOs will be consistently met after remedial construction because it removes the primary waste and principal threat from the flood plain. The Selected Remedy does contain some short term risks, which lowers its overall protectiveness. However, EPA has worked closely with all stakeholders to ensure that these risks are addressed and minimized to the extent practicable. The added costs associated with efforts to minimize the short term risks are worth the benefits to downstream users, and increase the overall cost-effectiveness of the Selected Remedy. EPA has also worked with the potentially responsible parties to lower costs when possible, such as allowing use of excavated material at the Opportunity Ponds, where approved, for cover material at Opportunity Ponds; and using other programs to remove the related Stimson Dam in association with the Selected Remedy.

13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

This finding looks at whether the *Selected Remedy* provides the best balance of trade-offs among the alternative with respect to the balancing criteria set forth in NCP § 300.430(f)(1)(ii)(B), with an emphasis on long-term effectiveness and permanence and reduction in toxicity, mobility, and volume [see NCP § 300.430(f)(1)(ii)(E)]. Modifying criteria were also examined in making this finding. In other words, the finding of practicability for use of permanent solutions and alternative treatment technologies to the maximum extent practicable is determined by looking at the remedy selection criteria and weighing trade-offs among those criteria.

EPA has determined that the *Selected Remedy* represents the maximum extent to which permanent solutions and alternative treatment technologies can be utilized in a practicable manner at the MRSOU. Of those alternatives that are protective of human health and the environment and comply with ARARs or justify a waiver, EPA has determined that the *Selected Remedy* provides the best balance of trade-offs in terms of the balancing criteria, while also considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal and considering State and community acceptance. EPA's balancing of the criteria and consideration of the criteria is explained in Sections 10.2.8, *State Acceptance*, 10.2.9, *Community Acceptance*, and 12.1, *Rationale for the Selected Remedy*, of this *Record of Decision*.

A permanent solution is employed in the Selected Remedy through dam and sediment removal and channel reconstruction. The *Original Proposed Plan* called for removal of sediments using a slurry pipeline to a nearby, newly created repository. The *Revised Proposed Plan*, which has been carried forward as the Selected Remedy, proposed a new, alternative treatment approach that may allow for beneficial reuse of the material. Atlantic Richfield Company proposed dewatering the sediments, which allows mechanical removal and transport by rail car to an existing waste repository. Because the sediments are projected to be low in metals content, much of this material could be used as a vegetative growth medium at the repository, which is managed by Atlantic Richfield Company. This may help to reduce the amount of barrow material Atlantic Richfield Company needs at the existing site. This approach also consolidates the waste to one repository site instead of creating a new site, so long-term management will only be required at one site instead of two.

13.5 Preference for Treatment as a Principal Element

The principal threat waste at the MRSOU—the sediments within Area 1—are not chemically treated onsite as part of the MRSOU *Selected Remedy*. They are removed from the flood plain and disposed of at an existing mine waste repository upstream of the site and out of the flood plain. This is appropriate because in-place treatment methods were not found during the *Feasibility Study* to be feasible or effective, and because the sediments can be effectively disposed of at the existing waste repository site.

There may be limited treatment of the removed wastes required at the Opportunity Ponds as part of the Remedial Action for that site, but that issue will be addressed under the Anaconda site remedial activities.

13.6 Five Year Reviews

Because this remedy will result in some contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

14 Documentation of Significant Differences

The *Revised Proposed Plan* for the MRSOU was released for public comment in May 2004. The *Revised Proposed Plan* identified a modified version of Alternative 7A2 as the Preferred Alternative for cleanup. As defined in this *Record of Decision,* this Selected Remedy includes mechanical excavation of the most contaminated reservoir sediments, removal of the spillway, and coordination with restoration of the Clark Fork and Blackfoot rivers to a free-flowing state. EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as identified in the *Revised Proposed Plan,* were necessary or appropriate.

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15 Coordination with Natural Resource Restoration Actions

Since the release of the *Original Proposed Plan*, the Natural Resource Trustees (USFWS, CSKT, and State of Montana) via the lead trustee, the State of Montana, have released and taken public comment on their restoration plan (*Draft Conceptual Restoration Plan*, May 2003; and First Amendment modifying and adopting the Draft Plan, June 2004). A significant portion of the restoration project encompasses the area where the Milltown Reservoir has slowed the flow of the river and created areas of sediment deposition. Restoration activities will be closely coordinated with the proposed remediation plan, specifically the Blackfoot River from the Milltown Dam up to the Stimson Dam and the Clark Fork River from the I-90 bridge below the Milltown Dam up to the high reservoir level above Duck Bridge.

EPA has worked with the Trustees to provide close coordination between the remediation and restoration plans within the remediation project area (the area from the dam to Duck Bridge on the Clark Fork River arm of the reservoir and to the Interstate Bridge on the Blackfoot River arm). Because the remediation and restoration plans must be closely integrated within the remediation project area, the restoration aspects of the project are reflected in the figures previously presented in this document. The coordinated restoration elements include the following:

- Removal of the divider block/power house/right abutment
- Changes in the flood plain and channel alignment
- Implementation of soft stabilization/revegetation techniques to stabilize the channel

Another element of this entire project is the removal of the Stimson Dam, which is being planned as a cooperative effort through the USFWS National Fish Passage Program with matching funds.

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Milltown Reservoir Sediments
Site Operable Unit
of the Milltown Reservoir/Clark Fork River Superfund Site

Record of Decision

Part 3: Responsiveness Summary

U.S. Environmental Protection Agency Region 8

10 West 15th Street
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Helena, Montana 59626

December 2004

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1 Introduction

This *Responsiveness Summary* is Part 3 of the *Record of Decision* for the Milltown Reservoir Sediments Operable Unit (MRSOU). The purpose of the *Responsiveness Summary* is to present the U.S. Environmental Protection Agency's (EPA's) response to significant stakeholder and responsible party (RP) comments on the *Proposed Plan* in accordance with 40 CFR 300.430(f)(3)(F) and Section 117(a) and (b) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA). The public outreach process used to encourage comment and participation on this decision is presented in this *Record of Decision* at Part 2, *Decision Summary*, Section 3.

This *Responsiveness Summary*, consists of four sections, as follows:

- **Section 1—Introduction:** Provides an overview of the public comment history and process.
- **Section 2—Original Proposed Plan Comments and Responses:** Provides an overview of the comments received from the public and various stakeholder groups on the April 2003 *Original Proposed Plan*, then summarizes with more detail the specific, significant comments received from all submittals. Responses to those comments are provided by the lead agency: Region 8 of the EPA, in consultation with the Montana Department of Environmental Quality (DEQ).
- **Section 3—Revised Proposed Plan Comments and Responses:** Provides an overview of the comments received from the public and various stakeholder groups on the May 2004 *Revised Proposed Plan*, then summarizes with more detail the specific, significant comments received from all submittals. Responses to those comments are provided.
- **Section 4—RP Comments and Lead Agency Responses:** Summarizes significant *Original Proposed Plan* comments from the RPs—the Atlantic Richfield Company and NorthWestern Corporation—and lead agency responses to those comments.
- **Section 5—Stakeholder and RP Categorized Comments:** The original text of the comments, from the stakeholders on both the *Original* and *Revised Proposed Plan*, and from the RPs on the *Revised Proposed Plan*, are provided as Adobe Acrobat Reader (PDF) files on an enclosed CD-ROM.

1.1 Public Comment History

The history of public involvement at the MRSOU is described in this *Record of Decision* in Part 2, *Decision Summary*, Section 3, *EPA, State, and Community Participation in the RI/FS Process*. Formal public comment on a preferred cleanup alternative began with the release of the *Original Proposed Plan* in April 2003. In this plan, EPA noted that changes may result from public comments or during the remedial process.

During the 90-day public comment period on the *Original Proposed Plan*, EPA received a significant number of comments that opposed disposing of the removed sediments at

Bandman Flats, the proposed local waste repository. EPA also received comment from the Atlantic Richfield Company, which presented new information and outlined a proposal to remove the sediments in a manner different than that described in the *Original Proposed Plan*. The Atlantic Richfield Company comment, developed in conjunction with Missoula contractor Envirocon, Inc., proposed to excavate sediments using conventional mechanical excavation equipment instead of hydraulic cutterhead dredges and proposed to haul the removed sediments by rail to, and dispose of them at, Opportunity Ponds rather than placing the materials in the Bandman Flats repository. EPA and DEQ evaluated this new information, required the Atlantic Richfield Company to produce additional information regarding potential scouring of sediment associated with the proposal, and brought in scientific peer reviewers from across the country to examine the modeling results. The agencies' conclusion after evaluating the new information was that the dry sediment removal and Opportunity Ponds disposal could be done safely and effectively.

In response to the public and RP comments, EPA issued a *Revised Proposed Plan* in May 2004. EPA held a 30-day comment period on the revised plan. Public comment was more favorable than for the *Original Proposed Plan*. The Selected Remedy in this *Record of Decision* is similar to the cleanup plan proposed in the *Revised Proposed Plan*. The Selected Remedy is described in detail in Part 2, *Decision Summary*, Section 12, *Selected Remedy*.

1.2 Public Comment Process

The analysis method used by EPA provided a means of categorizing (and thereby separating) comments into common topics, then grouping similar comments together so that the public's and stakeholder's comments could be thoroughly and efficiently examined. To accomplish this, EPA analyzed and responded to comments using a four-step process:

- First, EPA identified comment categories and subcategories after reviewing comment documents.
- Second, EPA assigned individual comments within each piece of correspondence a comment number, category, and subcategory.
- Third, EPA viewed the comments for each subcategory as a group and summarized the range of issues represented by the comments.
- Finally, EPA, in consultation with DEQ, wrote a response for each subcategory of comments.

The original comment letters, with categories and subcategories identified for each, are provided in Section 5, *Stakeholder and RP Categorized Comments*.

2 Original Proposed Plan Comments and Responses

2.1 Overview of Process, Responders, and Stakeholder Comments

A total of **3,853 people submitted comments**, excluding the Atlantic Richfield Company and NorthWestern Corporation (their comments and responses are summarized in Section 4, *RP Comments and Lead Agency Responses*). Many people submitted more than one comment document. Therefore, the **total number of comment documents submitted was higher, at 4,029,** excluding Atlantic Richfield Company and NorthWestern Corporation.

The statistics in this summary **are based on comment documents**—not people. Two basic types of comment documents are recognized:

- **Unique Comment Documents**, such as letters, e-mails, telephone messages, or postcards with additional comments written on them. We have a total of **336 unique comment documents**.

- **Form Letters,** which include such documents as postcards and form e-mails. We have a total of **3,693 form letters**.

To identify the range of the public represented by the comment documents, this section contains a description of the kinds of form letters received. Later, this section contains a description of the comment documents by commenter type.

2.1.1 Kinds of Form Letters Received

The form letters were grouped by the content of the postcard or e-mail, as shown below:

- Confluence: Form e-mail closing with restored confluence
- ForbaBlank: Postcard addressed to Forba with blank lines for comments
- Labor: Letter from several groups asking for local labor
- TwoRivers: Postcard from Two Rivers Community Park
- Opportunity: Form e-mail asking for Opportunity disposal
- TRCP: Form e-mail from Theodore Roosevelt Conservation Partnership members
- Wardell-1: Postcard to Wardell with one paragraph
- Wardell-3: Postcard to Wardell with three paragraphs
- Wardell-3_Opp: Postcard to Wardell with three paragraphs, plus a written comment on the postcard to use Opportunity Ponds as the sediment repository

If someone submitted two different kinds of form letters, for example, a "TwoRivers" postcard and a "ForbaBlank" postcard, each postcard was counted. That is, each postcard is counted in its group as a separate comment document, rather than just one for the person.

Exhibit 3-1 shows the number of comment documents received for each of these kinds of form letters.

EXHIBIT 3-1
Number of Commenters for Each Type of Form Letter: Original Proposed Plan

Group Name	Description	Count
Confluence	Form e-mail closing with hope for a restored confluence	1
ForbaBlank	Postcard to Forba with blank lines for comments	27
Labor	Letter from several groups asking for local labor	10
Opportunity	Form e-mail asking for Opportunity disposal	28
TRCP	Form e-mail from Theodore Roosevelt Conservation Partnership members	59
TwoRivers	Postcard from Two Rivers Community Park	304
Wardell-1	Postcard to Wardell with one paragraph	11
Wardell-3	Postcard to Wardell with three paragraphs	3,106
Wardell-3_Opp	*Postcard to Wardell with three paragraphs, plus a written comment on* the postcard to use Opportunity Ponds as the sediment repository	147

2.1.2 Comment Documents by Commenter Type

The authors of comment letters were organized into the following commenter types:

- Milltown Residents
- Missoula Residents
- Upstream Residents
- Downstream Interests
- Others
- No Address
- Meeting
- Groups
- Local Government
- Elected Officials
- Natural Resources Trustees
- Corporate Interests
- RPs

Exhibit 3-2 presents the numbers of comment documents submitted by each commenter type, including unique comment documents and form letters.

EXHIBIT 3-2
Number of Total Comment Documents Received, Listed by Commenter Type: Original Proposed Plan

Name	Description	Count
Milltown Residents	Milltown Area Residents (Bonner, Piltzville, Turah, Milltown)	42
Missoula Residents	Missoula Residents	2,671
Upstream Residents	Upstream Residents (Drummond, Clinton, Deer Lodge, Garrison, Anaconda, Butte)	38
Downstream Interests	Residents Downstream of Missoula (Frenchtown, Huson, Alberton, Rivulet, Tarkio, Superior)	27
Others	Other individuals from outside the CFB	816
No Address	People who did not supply an address	386
Meeting	Oral comments provided to EPA at meeting or hearing	2
Group	Citizen Groups and Organizations	30
Local Government	City and County agencies, Conservation District Board	5
Elected Officials	Mayors, senators, representatives, and other elected officials	2
Natural Resources Trustees	Federal, Tribal, and State Trustees	1
Corporate Interests	Corporate entities such as Mountain Water Co., Avista, PPL, etc.	7
RPs	Responsible Party comments (Atlantic Richfield Company, NorthWestern Corp.)	2

2.1.3 Types of Comments Received

All comments received during the comment period were categorized as shown in Exhibit 3-3, *Categories and Subcategories Applied to Stakeholder Comments*. Comments within each comment document were marked and assigned to a specific category and subcategory, regardless of whether the comment document was an e-mail, letter, fax, phone message, or public meeting transcript. These marked and categorized comment documents are available as part of the Administrative Record for this OU. Contact Diana Hammer to request a copy; a copying fee will be applied. Exhibit 3-3 also indicates the number of comments received for each category.

EXHIBIT 3-3
Categories and Subcategories Applied to Stakeholder Comments (Excluding the RPs): Original Proposed Plan

Categories	Subcategories	Description	Number of Comments
Opinion of Plan	Fully Supports Plan	Supports plan as written	3,560
	Conditionally Supports Plan	Supports plan with a few modifications	18
	Needs More Information	Does not support or oppose; needs more information	6

EXHIBIT 3-3
Categories and Subcategories Applied to Stakeholder Comments (Excluding the RPs): Original Proposed Plan

Categories	Subcategories	Description	Number of Comments
	Opposes Plan	Opposes the plan entirely as written	25
Dam Removal	Remove Dam	Desire dam removal	37
	Do Not Remove Dam	Do not want dam to be removed	22
	Powerhouse	Whether or not powerhouse should be removed with dam	16
Sediment Removal	Remove More Sediment	Remove more than is outlined in the Proposed Plan	35
	Remove Less Sediment	Remove less than described in the Proposed Plan	2
	Water Quality during Dredging	Water quality and treatment of dredged water	18
	Staging and Transportation	How removed sediment will be staged and transported	11
	Adequate Amount of Removal	Sediment to be removed in plan is correct as is	3
	Risks of Exposing Sediments	Risks associated with exposing sediments through removal	9
Bandman Flats Repository	Review Repository Considerations	Examine whether this is a good location or not	8
	Use Bandman Flats Repository	Dispose of contaminated sediments at Bandman Flats	6
	Do Not Use Bandman Flats	Do not use Bandman Flats as the sediment repository	56
	Modify Bandman Flats Site	Use Bandman but suggest modifications to site	13
Opportunity Ponds Repository	Use Opportunity Ponds	Use Opportunity Ponds for sediment repository	271
	Do Not Use Opportunity Ponds	Do not use Opportunity Ponds as sediment repository	3
	Transportation to Opportunity Ponds	Suggestions or concerns about transporting sediment to Opportunity	6
Channel Reconstruction	Backfill Source	Source of sediment for backfill following removal	3
	Design Considerations	Design of channel reconstruction project	3,381
	Bridge Structures	Impacts on Duck Bridge and other structures	11
Groundwater	Replacement Water Supply	Continuation of replacement water supply for Milltown	6
	Missoula Aquifer	Potential for impacts on Missoula aquifer if sediments are released	30

EXHIBIT 3-3
Categories and Subcategories Applied to Stakeholder Comments (Excluding the RPs): Original Proposed Plan

Categories	Subcategories	Description	Number of Comments
	Institutional Controls and Monitoring	ICs needed for groundwater use or protection	26
Human Health Risks	Contaminants in Surface Water	Human exposure to arsenic in surface water	14
	Air Quality	Air quality impacts during construction	19
Ecological Risks	Wildlife Habitat	Risks to wildlife in the Proposed Plan	18
	Aquatic Health	Risks to aquatic organisms in the Proposed Plan	16
	Upstream Inputs	Upstream inputs to Milltown Reservoir	3
	Sediment Transport Downstream	Concerns about downstream sediment transport	28
	Risks During Construction	Construction risks from floods, equipment failure, etc.	14
Opinion of EPA	No Mailing List	Request to be removed from mailing list	17
	Add to Mailing List	Add this name to the mailing list	2
	Public Outreach Effectiveness	Degree to which EPA's public outreach was successful	18
Economic Impacts	Construction Values	Economic impact of project construction	24
	Property Values	Value of properties adjacent to project	14
	Payment for Cleanup	Who should pay for the cleanup	22
	Community Economic Changes	Economic impacts or changes in surrounding communities	44
Comment Noted	No Response Required	No response needed because comment is an opinion	107
Unrelated Comment	Out of Scope	Comment was on an unrelated topic – no response needed	7
Compliance with Regulations	Other Federal Regulations	Compliance with ESA and other regulations	6
	Fully Considered Impacts	EPA's considerations of all impacts under CERCLA	8
	RAOs and RAGs	Appropriateness of goals and objectives	4
Comment Period	Extend Comment Period	Request extension of comment period	3
Social Impacts	Reservoir Recreation	Reservoir recreation impacts	2
	Two Rivers Park and Facilities	Concern about park and other community facilities	318
	Noise, Traffic, and Dust	Impacts from noise during construction	20

2.2 Stakeholder Comments and Responses

This section is organized alphabetically by category. The subcategories are listed under each category. Within each subcategory, a summary of the comments is provided, along with the lead agencys' response.

2.2.1 Opinion of Plan

2.2.1.1 Fully Supports Plan

Summary of Comments

Comments in this category stated full support of Milltown Dam and sediment removal. Some commenters may have asked for minor modifications, if possible, but did not base their support on whether or not those modifications occurred. For example, many people stated full support, and then suggested that the sediment repository location be someplace other than Bandman Flats. However, if the final repository location is Bandman Flats, they would still support the *Proposed Plan.*

Respondents provided many reasons for supporting dam and sediment removal. Many expressed enthusiasm for restoration of the confluence, achievement of fish passage, removal of risks to groundwater, and improvement of safety by removing an old dam structure. Some of the supporters urged EPA to move forward as quickly as possible with the *Proposed Plan* remedy.

Response

EPA acknowledges the support of more than 3,500 commenters for the *Proposed Plan's* recommended remedy.

2.2.1.2 Conditionally Supports Plan

Summary of Comments

These commenters would support the *Proposed Plan*, but only if modifications were made. For example, some commenters stated that they would support dam and sediment removal, but only if the sediments were not stored at Bandman Flats. Many of these respondents expressed concern that the removal methods, including the use of silt curtains and other protective measures, would be insufficient to prevent sediment from moving downstream during construction. Others were concerned that such a large re-shaping of the landscape and river channel would not be technically feasible and would cause more problems in the future. Several of the commenters felt that the plan goes too far and is too ambitious, while a few commenters felt that the *Proposed Plan* does not go far enough and that more sediment removal would be needed to protect downstream reservoirs and aquifers.

Response

EPA examined these comments and made adjustments to the *Record of Decision* to address many of these comments. Bandman Flats was replaced by the Opportunity Ponds as a repository for the sediments. Based on Atlantic Richfield Company's proposed change in removal methods and their agreement to build a temporary bypass channel for the Clark Fork River, the majority of the sediments will be excavated "in the dry" and transported by rail to the repository rather than hydraulically dredged. EPA disagrees that a new reach of channel and floodplain for the Clark Fork River cannot be designed to accommodate future hydrologic events. Remedial design of the final channel will undergo technical scrutiny by numerous experts, including the U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), the State of Montana, and other Trustees before the design will be approved for construction. EPA believes that changing the local environment from a reservoir to an active river channel, removal of the source sediments, and physical isolation of those with residual contamination in the manner described in the *Record of Decision* is the most prudent approach for safeguarding human health and the environment risk associated with the project.

Removal of all the sediments associated with the reservoir is not practical nor cost effective under EPA's remedy selection criteria, and we believe the remedy described in this *Record of Decision* best meets the remedy selection criteria. EPA had a wide variety of technical specialists involved throughout the Remedial Investigation/Feasibility Study (RI/FS) process, and used those people's views and input extensively in the remedy selection process. EPA did employ outside experts in evaluating sediment control measures, potential sediment scouring, and resultant downstream impacts from implementation of the remedy.

EPA, in consultation with DEQ, believes that the remedy does reflect the appropriate balancing of the long-term effectiveness and permanence balancing criteria with the other balancing and modifying criteria, as noted in Part 2, *Decision Summary*. EPA believes that the detailed monitoring requirements and performance standard definitions, along with institutional controls (ICs), will result in the reliable management of residual risk at the site.

2.2.1.3 Needs More Information

Summary of Comments

Commenters in this category did not support or oppose the *Proposed Plan*, but felt that more information would be needed to make a determination for themselves. Others felt that EPA had not yet fully addressed the risks of dam and sediment removal, and asked for more study before such drastic measures were taken.

Response

Proposed plans are summaries of EPA's proposed cleanup decision, provided for the public in a readable format. The Remedial Investigation, Risk Assessments, Feasibility Studies, and other documents contained more detailed information relating to the *Proposed Plan*. EPA supplemented the *Proposed Plan* with specific answers to specific questions, to ensure that the public had adequate information during the public comment period. This *Record of Decision* contains detail on the issues that commenters identified as too vague in the *Proposed Plan* – such as the risks relevant to dam and sediment removal, and efforts to control and reduce that risk.

2.2.1.4 Opposes Plan

Summary of Comments

These commenters were completely opposed to both dam and sediment removal as described in the *Proposed Plan*. Reasons for opposing the plan included concern that exposing reservoir sediments would create air quality problems, and that upstream contaminants from the Clark Fork River Operable Unit (OU) will no longer be trapped at Milltown and will just go to the next reservoir downstream. Others believed that it would be more cost-effective to install fish ladders and upgrade the dam to prevent ice scour incidents than to remove the dam and sediments, and that it is also better for the local economy. One respondent felt that the *Proposed Plan* did not contain enough detail to indicate that EPA used a good decision-making process, and that dam and sediment removal could have catastrophic consequences for the valley.

Response

EPA notes opposition to the *Original Proposed Plan*. EPA followed the process for Superfund decision making required by CERCLA and the NCP. The remedial action described in the *Record of Decision* meets the threshold criteria for remedy selection, and provides the best balance among the remaining balancing and modifying criteria. Issues such as air quality during construction, the transport of sediment from the upper Clark Fork River, fish passage, and ice scour are discussed in detail in Part 2, *Decision Summary*. The remedy selection analysis and the remedy are described in greater detail in Part 2, *Decision Summary*, Sections 10, 12, 13, and 14.

2.2.2 Dam Removal

2.2.2.1 Remove Dam

Summary of Comments

Comments in this category focused exclusively on the benefits of dam removal and did not address reservoir sediments or other issues. These commenters generally had the same reasons for supporting dam removal as described in the *Fully Supports Plan* subcategory.

Response

EPA acknowledges the comments expressing support for the removal of the dam. As explained in Part 2, *Decision Summary*, EPA intends to remove the spillway and radial gate and as part of the remedy. The powerhouse, right abutment, and dividing block would be removed as part of the State's restoration plan. Removal of the dam contributes to the permanence of the remedy by eliminating a site condition that resulted in the liberation of arsenic into the groundwater, reduces the threat of scour of contaminated sediments during infrequent ice buildup events, alleviates a perpetual collection point for deposition of new sediment, eliminates the perpetual operation and maintenance burden that accompanied retaining the dam, and restores the river to a free flowing state allowing the unimpeded passage of bull trout and other fish.

2.2.2.2 Do Not Remove Dam

Summary of Comments

These commenters advocated leaving the dam in place. Many of the commenters asked that the reservoir be dredged and the sediments removed, but to keep the dam as a trap for sediments and contaminants that might be coming from the Clark Fork River OU. Others felt that the human health and ecological risks were overstated, and the dam is fine left in place. One commenter felt that the dam serves an important flood control function for the City of Missoula and should remain for that reason. These commenters generally had the same reasons as those described in the *Opposes Plan* subcategory.

Response

EPA acknowledges the comments to retain the dam. However, EPA is required by law to seek a remedy that provides a permanent, long-term solution that is protective of public health and the environment. Leaving a perpetual sediment trap, as well as retaining a reservoir pool elevation that contributes to the recharge of the local aquifer and will inundate residual sediment deposits possibly creating similar conditions to those presently occurring, is not in the best interest of the community. The existence of a groundwater arsenic plume that has rendered a portion of the alluvial aquifer undrinkable is not "an exaggerated human health concern." The dam itself, as indicated by FERC inspection reports, will require some significant structural support if it is to reliably withstand future extreme hydrologic events. In its current state and if the proposed sediment volume were to be removed, it would provide only minor flood control downstream because of the small storage capacity in the reservoir.

2.2.2.3 Powerhouse

Summary of Comments

The people who expressed an opinion on the powerhouse were nearly equally divided. Approximately half would like the powerhouse to remain as a historic structure, while the other half felt that the powerhouse is incompatible with the restored confluence, from an aesthetic or from an engineering design perspective.

Response

EPA concurs that the National Historic Preservation Act (NHPA) does apply to the Milltown project. The entire Milltown Dam complex has been characterized and assessed for its historic value and public input relative to the dam was solicited as part of the process. Analyses by EPA and DEQ (the two agencies with responsibility for CERCLA action at the site) have determined that the Milltown Dam will be removed as part of the CERCLA action at the site. The removal of the spillway and radial gate is part of the remedial action at the site. The removal of the powerhouse, dividing block, and right abutment is part of the restoration plan developed by and under the authority granted to the Trustees. One of the primary objectives of the restoration plan for the Milltown area is to restore the river channel and floodplain to a naturally functioning and stable system. The Trustees believe that the most effective way to meet this objective is to remove the powerhouse, dividing block, and right abutment. Mitigation measures consistent with the NHPA, such as photo documentation and the off-site preservation of valuable equipment such as the turbines, will be applied before it is removed. More detailed information relative to this subject may be found in Part 2, *Decision Summary*, Section 5.7, *Important Cultural and Historical Features*, of this *Record of Decision*.

2.2.3 Sediment Removal

2.2.3.1 Remove More Sediment

Summary of Comments

Commenters in this category feared that leaving any contaminated sediment in place could create new problems downstream. As one person explained, "it seems inevitable that any sediments left in place within the floodplain will eventually be eroded and transported down the river, effectively moving the problem, albeit a smaller one, down to the next reservoir." A few commenters asked what measures would be used to prevent material from Areas 3 and 4 from eroding into the river after the remedy is completed, and whether previous sampling may have missed areas of higher contamination outside of Area 1.

Another stated that removing more sediment means that fewer engineering controls would be required for the reconstructed channel, since the river could freely meander over a cleaner floodplain.

Response

The *Remedial Investigation* of the Milltown Site characterized, through sampling, the entire OU. The designation of Area 1 originated from this work, which also identified Area 1 as the deepest, most heavily contaminated sediments and the "source area" from which most of the arsenic originates. These sediments are targeted for removal as part of the remedy. In addition, certain sediments within Area 3 which are more heavily contaminated will be isolated from the floodplain and armored to protect them from erosion. EPA believes that the remaining sediments in Areas 2 through 5, which contain lower level contamination, can be successfully addressed by conversion of the reservoir area to a free flowing channel (which accommodates a seasonally fluctuating water table), and the re-configuration and construction of a new, well vegetated Clark Fork River channel and floodplain through the project area. Above Duck Bridge, restoration activities may consolidate the braided channels created from the reservoir backwater and an aggrading channel bed into a single channel, with a meander pattern consistent with a natural, self-sustaining grade. EPA believes that a functional, natural floodplain with healthy riparian vegetation can be established that would accommodate and resist a variety of hydrologic regimes without unacceptably liberating the residual contaminants contained there.

2.2.3.2 Remove Less Sediment

Summary of Comments

Commenters in this category felt that sediments should not be removed at all. They believed that the sediments are better left in place.

Response

EPA evaluated this position by considering a number of alternatives that involved leaving the sediments and dam in place. In its evaluation process, EPA determined that removing the sediments and dam would allow for cleanup of the groundwater in a reasonable time frame, reduce the potential for harmful ice scour or high flow events, and provide for a more permanent solution. As such, the remedy meets the CERCLA criteria that determine the appropriate selection of a remedy at a Superfund site.

2.2.3.3 Water Quality during Dredging

Summary of Comments

People who commented in this category were concerned that water quality downstream will suffer during the dredging operation, in spite of the best management practices (BMPs) and construction barriers that will be used. A few commenters indicated that all process water may need to be treated before returning it to the river. Several people asked that a detailed contingency plan be established as part of the *Record of Decision*, in case of accidental spills or leaks occur during dredging. One commenter felt that the temporary water quality standards are not adequate to protect the fishery. Another asked that EPA study whether the dredging will release nitrogen or phosphorous, in addition to the metals that may be released.

Response

In the *Original Proposed Plan*, dredging was the chosen method for removing 85 percent of the sediment from Area 1. As a result of public input and innovative thinking by Atlantic Richfield Company's contractor, the primary method for removal of sediment described in Part 2, *Decision Summary*, Section 12, is "in the dry" excavation. Removal of the Milltown Dam early in the construction will reduce local groundwater elevations to allow for the excavation of most, if not all, of the targeted sediment. Implementation of construction BMP's during excavation provides more control of the sediment and reduces the likelihood of uncontrolled releases that might affect downstream water quality. The early construction and use of a temporary, armored bypass channel for the Clark Fork River will eliminate the scouring of contaminated channel bottom sediments from Areas 2 and 3 and will help control erosion issues associated with seasonal flow regimes for the duration of project construction. Timing of the opening of the bypass channel and the removal of Milltown Dam will be set to coincide with spring runoff. Temporary standards were selected carefully, in consultation with State and Federal wildlife protection experts, and are supported as protective by EPA's *Ecological Risk Assessment* (EPA 1993a and 2000). Surface water monitoring, including the use of caged fish studies and radio tracking, will be conducted on a frequent basis and compared to EPA's temporary water quality standards. EPA believes that through careful design and implementation of the remedy, downstream water quality will be protected.

2.2.3.4 Staging and Transportation

Summary of Comments

These commenters expressed concern that the staging area for sediment removal and transfer to trucks or rail is inappropriate. Many people said that this area is too close to Bonner School and residences, would pose threats to human health and safety, and should be moved away from the community. One person suggested that a small portion of the railroad track could be replaced to access the river directly near the sediment removal site. Then, material could be loaded directly into rail cars instead of staged and then loaded. Another suggested that dry removal be used instead of dredging so that the material could be loaded directly into rail cars and taken to Opportunity Ponds (this commenter was assuming that the Bandman Flats repository site would not be used). A few people were concerned that the newly developed trail system and pavilion recreational area near the reservoir would be destroyed by the staging area. Some people suggested putting the staging area on the south side of the river, or on the north bank immediately below the dam. A few people commented on the slurry line concept, and asked what spill control and prevention methods would be in place to make sure the floating line doesn't rupture.

Response

EPA carefully assessed the comments in this category and their safety implications. In response, the remedy described in Part 2, *Decision Summary*, Section 12, now proposes a sediment loading area west of the interstate. A rail spur and loading ramp will be constructed near Area 1 to facilitate the excavation and material handling process, as well as eliminate a potential safety hazard. Trains will still need to use existing tracks east of the interstate with some enhancements, but their movement will be restricted to late night departures and arrivals. The transport of contaminated sediment to Opportunity Ponds by rail eliminates the concerns associated with the previously proposed dredging and slurry transport of sediment to Bandman Flats.

2.2.3.5 Adequate Amount of Removal

Summary of Comments

These commenters felt that removing 2.6 million cubic yards (mcy) of sediment is the appropriate amount. They supported EPA's analysis and felt that this removal was adequate to protect human health and the environment.

Response

EPA appreciates the endorsement and believes that the remedial action described in this *Record of Decision* meets the threshold criteria for remedy selection, and provides the best balance among the remaining balancing and modifying criteria.

2.2.3.6 Risks of Exposing Sediments

Summary of Comments

Commenters were concerned about exposure of reservoir sediments during remedy implementation for a variety of reasons. Some of these reasons included air quality, erosion, and geochemical changes that might occur. Some people reasoned that exposing the sediments to air could cause arsenic in sediments to mobilize to groundwater. Others felt that removing sediments in one area and allowing the river to flow through other sediments will cause arsenic to become available to surface water. A few felt that the *Proposed Plan* contains too many unknowns about what exactly will happen when sediments are exposed, and therefore that removal is risky.

Response

In early fall 2002, the Milltown Reservoir underwent a planned drawdown event that was used to allow collection of additional sediment, soil, and groundwater samples. Analysis of these samples was performed to help answer questions about how the sediments and associated contaminants would react to dewatering and exposure to the atmosphere. EPA's contractors prepared several technical memos addressing the acid generating potential of the soils and sediments, and the potential for impacts to surface and groundwater (CH2M HILL 2002, Schroeder 2001, CH2M HILL 2003). In general, the investigations and modeling concluded that exposing the reservoir sediments to atmospheric conditions is not expected to present significant water chemistry problems. The pH of the sediments may range from slightly acidic to neutral, and adjustments can be made if necessary. Water associated with the sediments is also expected to display an intermediate pH similar to that for the sediment. The addition of Blackfoot and Clark Fork River water will increase the pH of seepage waters and groundwater associated with reservoir sediments through neutralization and dilution. Dissolved metals concentrations can be expected to decrease rather than increase. Earlier surface water quality modeling results by the USACE (Schroeder 2001) involving a dredging option also predicted that arsenic concentrations are not likely to exceed the Montana WQB-7 Standard for protection of human health during dredging with or without BMPs. EPA is comfortable with these findings and does not anticipate adverse water chemistry impacts, but will remain attentive to water quality monitoring results obtained during remedial action and make the appropriate adjustments if necessary.

2.2.4 Bandman Flats Repository

2.2.4.1 Review Repository Considerations

Summary of Comments

Commenters in this category asked EPA to consider whether Bandman Flats is the best site. Some of the factors that people asked EPA to review include human health, long-term ecological protection, and the highest and best use of this site (as a repository or as developable land for the community). These people did not ask that the site be changed, but that the process for selecting the site be made clearer and that the basis for the decision be rooted in human and ecological health rather than overall remedy cost.

Response

EPA carefully assessed the comments in this category. Coincidentally, Atlantic Richfield Company and their contractor proposed changes in sediment removal methods and the location of a repository. Atlantic Richfield Company proposed dewatering and excavating the sediments, loading them locally into train cars and transporting them by rail to the Opportunity Ponds near Anaconda for disposal. The high organic content of the sediment may make it a useful capping material that would support plant life. EPA approved these changes which are described in more detail in Section 12.3.4, *Sediment Transportation and Disposal*, of the *Record of Decision*.

2.2.4.2 Use Bandman Flats Repository

Summary of Comments

Commenters in this category were comfortable with EPA's analysis of the Bandman Flats site, and felt that the site had undergone sufficient scrutiny to be used. A few indicated that the slurry pipeline and short transportation route increased safety during remediation.

Response

EPA appreciates endorsement of the local repository idea. However, the remedy, as described in Part 2, *Decision Summary*, Section 12, of this *Record of Decision*, has changed since the *Original Proposed Plan*. Sediment removed from the project site will now be transported by rail to the Opportunity Ponds.

2.2.4.3 Do Not Use Bandman Flats

Summary of Comments

These people felt that Bandman Flats would not be appropriate for a repository, but did not specifically endorse another site or alternative. Reasons for opposing the site include human health, potential ecological risks if the liner fails, and economic impacts on the community. Currently, a golf course and housing development is proposed near the site, and this area is becoming a popular location for development. The individuals who are attempting to develop this area indicated that a repository would be the "kiss of death" for their project and make it impossible to acquire financing. Most of the commenters felt that encouraging housing and business development in the Bandman Flats area is much more appropriate for the economic recovery of the neighboring communities. Further, they felt that locating a waste repository between Bonner and Missoula would discourage development and adversely impact the community. A few expressed concern about locating a toxic storage site near the Kim Williams trail and impacting recreation opportunities. Some people simply felt using Bandman Flats takes one contaminated site and creates a second opportunity for contamination in the Clark Fork River area. Others felt that no liner could be considered safe "in perpetuity" and that the risks of further contamination in the future, or of contaminating the Missoula aquifer, are too high. One commenter indicated that the permeability of the soils is too high to consider its use as a repository. Some people were concerned that the Bandman Flats site would not be large enough to contain all of the sediments.

Response

EPA read and evaluated these comments carefully. As indicated in previous responses, EPA accepted changes to the *Original Proposed Plan* based on proposals made by Atlantic Richfield Company and their contractors. EPA felt that recommendations made by Atlantic Richfield Company strengthened the remedy and resulted in the Bandman Repository site being replaced by the Opportunity Ponds as the repository for excavated sediments. The many comments stating opposition to the Bandman Flats repository helped EPA conclude that the project was better served by accommodating Atlantic Richfield Company's proposal to transport the material to the Opportunity Ponds. A more detailed discussion of the Opportunity site is provided in Part 2, *Decision Summary,* Section 12.3.4, *Sediment Transportation and Disposal,* of this *Record of Decision.*

2.2.4.4 Modify Bandman Flats Site

Summary of Comments

Commenters in this category indicated that Bandman Flats could be a good repository site, but only if certain modifications were made in the design. These people offered several specific proposals for lining the repository, installing a leachate cap, locating the slurry line, ensuring protection from the probable maximum floods, and re-designing nearby bridges and structures to better accommodate sediment transport to Bandman Flats.

Response

EPA appreciated all the comments and suggestions provided under this category. As discussed in the previous response, the Bandman Flats Site was replaced by the Opportunity Ponds as the preferred repository site.

2.2.5 Opportunity Ponds Repository

2.2.5.1 Use Opportunity Ponds

Summary of Comments

All of the commenters in this category supported using the Opportunity Ponds repository. In addition to the reasons expressed by those who opposed the Bandman Flats site, some commenters indicated that Opportunity Ponds is already an impacted area and existing repository, so the addition of more contaminated sediment is not a critical issue. Many commenters felt that the sediments should be transferred to Opportunity Ponds regardless of the cost involved. A few people suggested that the Berkley Pit would be an appropriate location to landfill the contaminated sediments. One person indicated that if it were found during remediation that more sediments would need to be removed, then Opportunity Ponds would offer adequate space to store additional sediment.

Response

EPA agrees with the use of the Opportunity Ponds as the primary repository. The sediment proposed for disposal (the exact amount will be determined during design) will represent less than 1 percent of the total wastes disposed of at this location. The excavated waste can be transported and disposed of safely. In addition, the high organic matter content of the sediment may allow it to be used in a positive manner because of its ability to support plant growth. It also prevents the creation of another waste repository within the Clark Fork River Basin.

2.2.5.2 Do Not Use Opportunity Ponds

Summary of Comments

People who are opposed to using Opportunity Ponds as a repository cited concerns about accidents or spills during transport. One person was concerned that the people near Opportunity Ponds may not want additional waste in their area, and another thought that this change might cause a lawsuit that could delay the entire project.

Response

Sixteen trains (typically with 100 cars each) pass through the project corridor per day. These trains presently transport a variety of cargo, which includes industrial and agricultural chemicals, fuels, and other manufacturing and natural resource goods. Transporting materials by train is considered safe and economical, and the additional Milltown waste will not significantly increase railcar numbers or risk. EPA acknowledges the concerns of the residents of Opportunity. However, EPA believes that disposal of this material at this location, which is on Atlantic Richfield Company property and a distance away from the town of Opportunity, best meets the threshold and balancing evaluation criteria while significantly reducing human health and environmental risks.

2.2.5.3 Transportation to Opportunity Ponds

Summary of Comments

Comments in this category did not specifically state a preference for using or not using Opportunity Ponds, but rather expressed concern that transporting sediments back upstream creates the potential for accidents. A few felt that the cost involved in the transportation is not worthwhile.

Response

EPA acknowledges these concerns and will work to ensure a safe transportation plan is in place for the rail haul of excavated sediments. Rail transportation, as previously stated, is a safe, economical, and expedient means of moving material. The sediment being placed into leak proof rail cars will be dewatered before loading and covered during transit. All the safety precautions presently in place to guide the safe operation of trains will be applied to the activities of these trains. Transport schedules will move loads late at night to help reduce impacts on local traffic patterns and take advantage of open rail time.

2.2.6 Channel Reconstruction

2.2.6.1 Backfill Source

Summary of Comments

Primarily, these individuals asked where the backfill to replace 2.6 mcy of removed sediments would come from. One person indicated that if the soil is to come from Bandman Flats, then it would not make sense to transfer the waste to Opportunity Ponds.

Response

The rodeo grounds near Bonner, Montana, are proposed as the source of much of the borrow material to be used for floodplain construction. Most of the detailed decisions regarding suitable sources for borrow material will be made and confirmed during the remedial design phase of the project. Preliminary estimates indicate an adequate volume for construction without using the previously considered repository site of Bandman Flats.

2.2.6.2 Design Considerations

Summary of Comments

Most people asked EPA to work closely with the State of Montana and other partners to ensure that the design of the new channel dovetails with restoration plans. Some asked for enhanced recreational opportunities, such as a whitewater park. Others said that a whitewater park would be inappropriate, and the area should instead be managed solely for wildlife habitat and wetlands. One suggested that a low-head hydroelectric power plant be incorporated in the new channel to replace the lost generation from Milltown Dam. Many people were concerned that the *Proposed Plan* is too vague on the issue of channel design, and feared that the channel will not be compatible with recreation or aesthetic values in the valley. Some indicated that putting the channel in the remaining reservoir area will create severe erosion and contamination problems.

Several people commented that the design should incorporate as many natural floodplain processes as possible instead of a highly "engineered" solution involving hard banks. Others felt that hard engineering structures would be needed to prevent headcutting of the channel. Still others indicated that ice scour and flooding would continue, and that any channel design would have difficulty in passing such a flood without seriously damaging the streambanks and releasing contamination. Some felt that the channel location indicated in the *Proposed Plan* is too close to the interstate and would require too much armoring to protect the road and bridges, and one person indicated that an old dump was located in that area in the 1950s before the interstate was built over the top of it. A few people offered specific engineering proposals for removing the dam and sediments in the best way to support channel reconstruction.

Response

EPA has worked with the Trustees to provide close coordination between the remediation and restoration plans within the remediation project area (the area from the dam to Duck Bridge on the Clark Fork River arm of the reservoir and to the Interstate Bridge on the Blackfoot River arm). Because the remediation and restoration plans must be closely integrated within the remediation project area, the restoration aspects of the project are reflected in the maps and drawings that appear in Part 2, *Decision Summary*, Section 12, of this *Record of Decision*. The coordinated restoration elements include the following:

- Removal of the divider block/power house/north (right) abutment
- Changes in the floodplain topography and channel alignment throughout the OU
- Implementation of soft stabilization/revegetation techniques to stabilize the channel

Another related element to this entire project is the removal of the Stimson Dam, which is being planned as a cooperative effort through the USFWS National Fish Passage Program.

A new channel and floodplain for the Clark Fork River will be constructed extending from approximately 1.5 miles upstream of Duck Bridge to the I-90 bridge downstream of the dam. The new channel will reflect a "restoration" design that matches a more natural meander pattern with a sustainable gradient. Recreational use will be preserved and wetlands will be created in accordance with direction provided by USFWS and Montana Fish, Wildlife and Parks (FWP). There are presently no plans to incorporate a low head hydropower facility in this reach of the river. EPA acknowledges the concerns of commenters regarding the proximity of the new channel to the interstate, and the potential for erosion and future ice jams. EPA and the USACE will address these concerns during final design and consider safety to be a high priority. Where possible, natural materials will be used for construction purposes to dissipate energy and accommodate the required fluctuations in flow regime as described in Part 2, *Decision Summary*, Section 12.3.8, *Clark Fork River and Blackfoot River Channel*.

2.2.6.3 Bridge Structures

Summary of Comments

Most people who had comments in this category were concerned that removing the Milltown Dam will create engineering problems for upstream bridges because of headcutting, and downstream bridges because of flooding. Commenters feared that these bridges could become destabilized or eventually be destroyed. Many people commented on an alternative design for Duck Bridge that would need to be adjusted if the dam is removed and the channel reconstructed.

Response

Undermining the structural integrity of existing bridges through implementation of remedial activities is also a concern to EPA. These issues will be resolved through modeling and careful remedial design and use of engineering controls where necessary. Atlantic Richfield Company's technical team has also recognized these issues as concerns. The design will be carefully reviewed by EPA's contractor (USACE, Seattle District) structural and hydraulic engineers before authorization to proceed is provided.

2.2.7 Groundwater

2.2.7.1Replacement Water Supply

Summary of Comments

Commenters felt that the replacement water supply is an adequate solution to the reservoir contamination problem. Since the groundwater plume has been stable for many years, these people do not feel that further action is needed at the MRSOU. One person indicated that disturbing the sediments creates more ecological and human health risks, and that those risks are adequately managed with the replacement water system and the presence of the dam.

Response

EPA agrees that the replacement water supply has served as an excellent interim solution to contamination of the aquifer by an arsenic plume. EPA notes that there are no permanent ICs in place to prevent domestic use of the groundwater near Milltown. EPA is mandated through the application of specific criteria, to seek a permanent solution that greatly reduces or eliminates the risk to human health and the environment. EPA believes that the remedy as proposed in Part 2, *Decision Summary,* Section 12, will meet the following primary remedial action objectives:

- Protect human health and the environment
- Attain compliance with applicable or relevant and appropriate Federal and State standards, criteria, and requirements

Under the present remedy (dry excavation with a bypass channel), EPA does not believe that disturbing the sediments in Area 1 will create any unacceptable risks to human health or the environment. Incorporating construction BMPs, continuous downstream monitoring of surface and groundwater, and careful scheduling of major field construction activities (dam demolition, construction and opening of the bypass, etc.) should mitigate potential risks inherent to these activities.

2.2.7.2 Missoula Aquifer

Summary of Comments

Commenters in this category were concerned that removal activities will impact the Missoula aquifer. Regardless of their position on dam removal, these people felt that EPA should provide a written guarantee that degradation of water quality will not occur in the Milltown aquifer, and a detailed plan and commitment of funds for restoring clean water if degradation does occur. Mountain Water Co., the utility that draws from the Missoula aquifer, felt that the *Proposed Plan,* as written, does not include enough monitoring or controls to be protective of the Missoula aquifer.

Response

EPA is committed to safeguarding the potable water supply of the Missoula sole source aquifer and area residents. EPA has conducted surface water quality modeling (P. Schroeder, USACE, 12-31-01 Memo to EPA; Final Tech Memo Milltown Reservoir Dry Removal Scour Evaluation, Envirocon, May 17, 2004) to evaluate the potential impact on surface water and has concluded that no impact is likely on the Missoula Sole Source Aquifer from remedial activities proposed as part of the Milltown cleanup. Furthermore, EPA proposes extensive and frequent monitoring of both surface and groundwater monitoring to gage the status of water quality during the construction activities. This *Record of Decision* requires the provision of alternate water supplies for any domestic well or water source which is unexpectedly contaminated during remedy implementation.

2.2.7.3 Institutional Controls and Monitoring

Summary of Comments

Commenters in this category focused on the long-term recovery of the contaminated aquifer below Milltown. Many simply indicated that they hope the aquifer can some day be used again for drinking water. Others questioned EPA's projection that the aquifer would recover with only part of the sediments removed, and asked if a contingency plan were in place for removing additional sediment if the aquifer was not recovering. A few questioned the use of ICs to limit groundwater access until the aquifer recovers through natural attenuation, and felt that the need for ICs indicates that this is not a permanent remedy. These people request more aggressive measures to clean the aquifer. Some people asked that performance standards be made a key part of the long-term groundwater monitoring plan.

Response

EPA's primary remedial action objective (RAO, Part 2, *Decision Summary*, Section 8, of this *Record of Decision*) is to "protect groundwater by restoring it to its beneficial use in a reasonable time." This will be achieved by the removal of the primary contaminant source material (sediments) that reside in Area 1 and the removal of the Milltown Dam (will lower the water table). Sediment with lower arsenic and copper concentrations will be shielded from the active river channel by revegetation efforts. Through natural processes, EPA predicts that the arsenic plume should clean up within 4 to 10 years. The ICs are intended to act as safeguards to public health by preventing the use of this portion of the aquifer until it meets water quality standards. Short and long-term monitoring are incorporated into the remedy. The remedy is subject to ongoing reviews to ensure that the objectives and performance standards, including those relating to groundwater cleanup, are met.

2.2.8 Human Health Risks

2.2.8.1 Contaminants in Surface Water

Summary of Comments

Commenters in this category feared that the sediment removal process would release arsenic into surface water. People indicated that the arsenic could contaminate groundwater after it is released into surface water, and also contaminate drinking water sources downstream. A few indicated that monitoring surface water would be just as important as monitoring groundwater for arsenic levels. Some also suggested that fish could be contaminated with arsenic, and that health risks to people could follow from eating the fish.

Response

In 2001, EPA worked with the USACE (Seattle District) to model potential surface water quality impacts (USACE, P. Schroeder, 2001) that might occur, should sediment pore water and suspended sediment be released during the proposed removal of sediments, which at that time consisted of 15 percent excavation and 85 percent dredging. The results of the modeling illustrated that arsenic, cadmium, lead, and zinc concentrations are not predicted to exceed the Montana acute toxicity standards during dredging. Similarly, arsenic and zinc are not predicted to exceed the Montana chronic toxicity standards. Arsenic concentrations are also not predicted to exceed Montana WQB-7 Standard for the protection of human health during the dredging. As previously stated in other responses, the transition of the project into dry removal of the sediments after the dams have been removed and a bypass for the Clark Fork River constructed further reduces the potential for water quality impacts. Under this *Record of Decision*, the reservoir is eliminated, groundwater levels are reduced, and sediment scour during construction by the active Clark Fork and Blackfoot Rivers will be minimized with use of the bypass and the timing of major field activities to coincide with spring runoff. Hence, the source of dissolved and total recoverable arsenic associated with the total suspended solids loads, that could theoretically infiltrate the local Milltown aquifer and the Missoula sole source aquifer below Hellgate Canyon, is greatly diminished by the change in the sediment removal method. EPA will have a comprehensive water quality monitoring program during the project that compares predetermined standards to existing water quality data. Vigilant monitoring will be a cornerstone of early detection of problems and making appropriate adjustments to mitigate any potential impacts. EPA believes that the remedy does not pose a threat to the sole source Missoula aquifer or the residents that draw from it as a potable drinking water source.

2.2.8.2 Air Quality

Summary of Comments

All of the commenters in this category feared that exposing, staging, and transporting contaminated sediments would release arsenic into the air. Some asked for air quality monitoring and performance standards to assure that BMPs are applied and public health is protected. A few commenters expressed concern for high-risk populations, such as children (at Bonner School), the elderly, and asthmatics, that may be adversely affected to a greater degree than the general public.

Response

EPA understands the concern about construction activities generating dust, particularly during the drier seasons of the year. All of the excavation and rail loading work will be located west of the Interstate and away from local structures and residences. Precautions to reduce dust levels, such as keeping roads moist, will be implemented as part of the site activities. Construction BMPs, to be identified in detail during remedial design, will be used during the remedial work to assure that the generation of contaminated dust and inhalation exposure is minimized.

Additionally, EPA believes the risks posed by construction dust are not significant. The *Baseline Human Health Risk Assessment* (ETI, July 1993) performed an evaluation of the risk associated with dust inhalation and ingestion of contaminated soils and groundwater. It was concluded that the inhalation risk (for arsenic and cadmium) was small compared to the risk posed by ingestion. These finding were confirmed in 2003 by an Agency for Toxic Substances and Disease Registry (ATSDR) review of human health effects from dust inhalation.

2.2.9 Ecological Risks

2.2.9.1 Wildlife Habitat

Summary of Comments

The commenters in this category expressed the belief that wildlife populations would be adversely affected by the remediation described in the *Proposed Plan*. They feel that dam and sediment removal will destroy the wetlands surrounding the reservoir, and adversely impact bald eagles, waterfowl, migrating birds, amphibians, deer, moose, and other species. Some asked if the wetlands could be preserved or restored following remediation.

Response

EPA agrees that the remedial action, as described in this *Record of Decision*, will result in a dramatic change to the wetlands of the reservoir. Trustees such as the USFWS, USACE, and FWP have been working with, and advising, EPA on the remedial action and associated mitigation for any destroyed wetlands. The restoration plan will create valuable riparian wetlands at the site. Replacement of any destroyed wetlands is required. Two extensive Biological Assessments, one for bull trout and a second one for the terrestrial threatened and endangered species (including bald eagles, grizzly bear, etc.) have been prepared by EPA (CH2M HILL 2004a, 2004b). These documents outline, in detail, the anticipated impacts and proposed mitigation for aquatic and terrestrial species of concern.

2.2.9.2 Aquatic Health

Summary of Comments

Several topics were discussed in this category, including water quality, risks to fish populations, and bull trout passage. Some in this category argued that water quality is not impacting fish now, and that implementing the remedy could make water quality worse and affect fish. A few indicated that ice scour risks are still high, and that this has the potential to continue to impact fish populations. One person asked why the remedy would be implemented at all if the surface water would still not be expected to meet State of Montana water quality standards. Another said that the *Proposed Plan* is an important protective measure, since a natural disaster could wipe out the dam and create a massive release of contaminated sediments. While many people supported dam removal on the basis of restoring connectivity for bull trout populations, a few argued that bull trout flourish above the dam and the connectivity is not important or desired.

Response

Responses to concerns relative to implementation of the remedy and its effects on water quality have been addressed in previous comment responses (and are discussed in Section 12, *Selected Remedy*, of Part 2, *Decision Summary*). EPA believes that the remedy will meet Montana WQB-7 standards with the exception of copper exceedances caused by upstream releases. Removal of the primary source of contamination, removal of the Milltown Dam, and the design and construction of a new channel will eliminate the potential for a catastrophic natural disaster should the Milltown Dam fail. It also reduces the potential for ice scour events that generate and transport contaminated sediment downstream. The remedy will create a free flowing passage for a variety of fish species, including bull trout, to migrate directly into the Blackfoot River drainage and the upper Clark Fork River.

2.2.9.3 Upstream Inputs

Summary of Comments

Commenters in this category feel that the *Proposed Plan* should not be implemented until the Clark Fork River OU is completed. The primary reason given for this is that if a flood occurs during remediation activities upstream, the dam should be kept in place to prevent contamination from washing further downstream.

Response

Implementation of the Clark Fork River OU remedy will require approximately 10 years to complete. The existing conditions in the upper Clark Fork do not resemble those of historic times when mine tailings and waste were discharged directly into Silverbow Creek, the Clark Fork River, and other tributary streams. Years of floods and rainfall events have scoured most of the available waste material and transported it downstream. EPA does not believe that sustaining the Milltown reservoir as an in-stream mine waste repository is necessary or useful under these conditions. EPA is obligated to implement a permanent remedy in a timely fashion to resolve human health and ecological risk concerns associated with the MRSOU. The remedy as proposed accomplishes this task while meeting the required CERCLA criteria.

2.2.9.4 Sediment Transport Downstream

Summary of Comments

All commenters in this category were concerned that the sediments behind Milltown Dam could wash downstream and cause contamination problems either along the river or at Thompson Falls Reservoir. People felt that no BMPs would be sufficient to prevent all sediment from going downstream during remedy implementation, and that sediments escaping from Milltown Reservoir are of greater concern than in ordinary construction or dredging projects because of arsenic in the sediments. One person asked that total maximum daily load (TMDL) studies be completed on the Clark Fork and Blackfoot rivers and all tributaries before implementation of the *Proposed Plan*.

Response

EPA heard your comments and has responded with the *Revised Proposed Plan*. This *Record of Decision* describes a new method of removing the sediments in Part 2, *Decision Summary*, Section 12. The new method begins with construction of an armored bypass channel intended to prevent scouring of contaminated sediments as the reservoir is drawn down and the dam is removed. The bypass was selected to specifically limit the potential for sediment scour and transport through the project area. The timing of field activities (such as opening of the bypass and removal of the dams), and coordination of such activities with spring runoff, is intended to help reduce any unforeseen impact associated with the liberation of the sediment resulting from the major field activities. EPA is coordinating the remedy with Montana DEQ, Montana Natural Resource Damage Program (NRDP), FWP, USFWS, and the Confederated Salish and Kootenai Tribes (CSKT). Many of theses agencies have direct responsibility and stewardship for the water and aquatic resources of the Clark Fork River. They have reviewed the proposed remedial action, understand the potential concerns and detrimental impacts (most of which are short-term) to the resources, and endorse the program because of the long-term rehabilitating aspects of returning the rivers to a free-flowing status.

2.2.9.5 Risks During Construction

Summary of Comments

One of the primary concerns cited in this category was the risk of spills, regardless of truck, rail, or slurry pipe transport. Another concern expressed by commenters was the risk of a flood during construction that could destroy protective measures. Some commenters asked for detailed construction monitoring plans to mitigate these risks, while others felt that these risks were too great to attempt dam removal.

Response

EPA acknowledges the concerns about uncontrolled releases of contaminated sediment during transporting activities. Under this *Record of Decision*, sediment will be removed in the "dry" and loaded directly into rail cars located in the project area. Transportation of the sediment to the Opportunity Ponds will be conducted carefully. Trains will move at night during off hours and will be under scrutiny to observe all safety requirements that typically apply to the movement of hazardous materials by rail.

Flooding during the construction period is a potential risk of the project. The remedial design will incorporate mitigation to guard against floods up to a 100-year event (by increasing the capacity of the bypass channel and armoring banks and other potential erosion points). However, the risk of an extreme event (greater than a 100-year flood) remains. EPA intends to mitigate this issue by requiring the project (the removal process) be managed into a more compact schedule (5 years) that would reduce the risk for upset resulting from the occurrence of an extreme hydrologic event. During the construction period, EPA, with the help of the U.S. Geological Survey (USGS), intends to be watchful for climatic conditions that would indicate the potential for an extreme event.

2.2.10 Opinion of EPA

2.2.10.1 No Mailing List

Summary of Comments

People who requested that they not be added to the mailing list were not added.

Response

EPA thanks you for your comment on this project.

2.2.10.2 Add to Mailing List

Summary of Comments

People who requested further information were added to the mailing list.

Response

EPA thanks you for your comment on this project and for your interest in receiving project related information, and has added these commenters to the mailing list.

2.2.10.3 Public Outreach Effectiveness

Summary of Comments

Some of the commenters felt that the EPA public outreach process has been effective, while others have felt "left out of the loop" and that their concerns have not been addressed. A few other people commented that there has not been enough detailed information for the public to make an informed decision.

Response

EPA has a rich history of stakeholder and community involvement on the Milltown project since 1981. Over the years, community members have had ample opportunity to be involved and learn the details of all facets of the project. Local community members have participated individually and through groups such as the Clark Fork Coalition, Trout Unlimited, Bonner Development Group, Bonner-Milltown Community Forum, Friends of Two Rivers, Milltown Redevelopment Group, and Missoula County. EPA believes that adequate information has been provided for the public to understand the project and be able to make an informed opinion. EPA has made information available via public meetings, fact sheets, direct mailings, web pages, etc. See further detail about community involvement at this site in Section 3 of the *Record of Decision*.

2.2.11 Economic Impacts

2.2.11.1 Construction Values

Summary of Comments

Comments in this category focused on the economic impacts of remedy construction on the valley. Most of the commenters requested that local, union labor be used on the construction project. A few specifically requested that local equipment be used so that the business equipment tax would benefit the local school district and the county. One person requested a workforce retraining program to help out-of-work timber industry employees to learn skills needed for working on the remedy.

Response

The remedy for the MRSOU may have an overall cost of close to $100 million. Previous experience with other cleanup projects in the basin indicate that much of that money will go to local contractors and businesses. For instance, approximately 95 percent of the $30 million spent so far on cleanup of Silver Bow Creek has been paid to Montana contractors. This will have an overall positive impact on the local economy for the duration of the Milltown project, which is expected to be approximately 5 to 7 years.

2.2.11.2 Property Values

Summary of Comments

Most people expressed concern that this project could lower property values throughout the Bonner and east Missoula areas. According to several commenters, this area is already depressed, and staging a major remediation project while locating a new waste repository in the same area would devastate property values and the tax base for the economy. Some people are concerned that some private wells will become useless or require more drilling because of a drop in the water table. Proponents of development near Bandman Flats, which might be threatened if the repository is sited there, expect that their development would give a large boost to local property values. A few commenters in this category felt that property values would increase after the remediation was completed and the confluence was restored.

Response

EPA has listened to these concerns and revised the *Proposed Plan* accordingly, as stated in previous responses. This *Record of Decision* describes a new method for removing sediments in the "dry" and transporting them by rail to the Opportunity Ponds near Anaconda. The Bandman Flats repository site is no longer under consideration. The remedial action and restoration activities proposed for the MRSOU should have a positive effect on local property values after the work is completed. During construction, the County's tax base should increase because of the local construction activities. EPA has stated that if remedial construction adversely affects local potable water supplies by lowering the water table, they would work with the property owner to re-establish a viable source of drinking water.

2.2.11.3 Payment for Cleanup

Summary of Comments

None of the people who commented in this category felt that the taxpayers should bear any responsibility for the cleanup, and asked that the RPs be held responsible for the entire cost. Some were concerned that the remediation costs would not be combined with restoration costs or a restoration plan. Thus, EPA would address human and ecological risks through the remedy, but the valley would not be restored to a condition that aesthetically supports recreation use or wildlife. These commenters felt that funding for restoration must be identified before remediation work begins.

Response

The RPs for the Milltown Site are Atlantic Richfield Company and NorthWestern Corporation. They will bear the burden of the costs associated with all remedial activities within the Milltown OU, including ICs and BMP activities. In a previous agreement, Atlantic Richfield Company settled with the State of Montana on natural resource damage claims for this area. The State has additional claims against NorthWestern Corporation. A portion of this settlement money, along with the funds from any settlement with NorthWestern Corporation, will be used by the State in concert with remedial activities to achieve a pre-determined restoration design. The remedial design will incorporate restoration concepts requested by the State that do aesthetically support recreation use and wildlife habitat. Taxpayer dollars will not be used for this cleanup.

2.2.11.4 Community Economic Changes

Summary of Comments

Many commenters in this category desired reimbursement to Bonner School, the community of Bonner, and the County for lost property tax revenue as a result of dam removal. Many of these people felt that a trust fund should be established (some suggested a $3 million fund), perhaps funded by the RPs, to compensate for a projected loss of $80,000 to $90,000 annually in tax revenue. A few others were concerned with the loss of the hydroelectric power that the dam provides. One commenter was concerned that short-term impacts on the downstream fishery could put smaller fishing shops out of business.

Many other commenters feel that this project, when completed, will be a boon to the local economy. These commenters cited additional purchases of goods and services by tourists, and removal of the "Superfund site stigma" that has historically slowed growth in the area. Several commenters indicated that Bonner is slowly changing from a resource-based economy to a tourism-based economy, and that this project will help provide more recreation opportunities and a better fishery to help the local economy improve. Some commenters, who are opposed to locating the sediment repository at Bandman Flats, cited the development opportunities for open space near the river, and the increased tax base such development would bring to the community.

Response

In the short term, the tax base for the County should increase because of construction of the project. It is true that over the long term the County will lose tax base support once provided by operation of the dam. Revenue from the dam has been decreasing steadily over the past few years and now constitutes 1.59 percent of school revenue in 2004. Remediation of the sediments and re-establishment of the free flowing status of the Clark Fork and Blackfoot Rivers should have a positive effect on the local economy through additional development, improved health of local fisheries, and enhanced recreational opportunities along the rivers, and restoration of the local drinking water supply.

2.2.12 Comment Noted—No Response Required

EPA read many comments that were general opinions or historical data and did not comment directly on a specific component of the *Proposed Plan*. For example, such comments ranged from, "let proven science determine when and how the process is done, not politics," to, "rhetoric printed about the Milltown Dam is the obvious one-sided opinion printed in the *Missoulian*." Some of the other comments included data from other Superfund sites, historical anecdotes that enhance EPA's understanding of the project area, and copies of articles and presentations concerning the MRSOU. These opinions and information benefited EPA's staff and assisted with development of the *Proposed Plan*. However, a direct response was not possible.

Response

No specific response is required.

2.2.13 Unrelated Comment—Out of Scope

These comments concerned projects that are outside of the *Proposed Plan* and the MRSOU. Examples include conducting extensive sampling at Thompson Falls Reservoir, suggestions about cleanup procedures in the Clark Fork River OU, and the influence of water rights after the remedy is implemented.

Response

These comments were deemed to be outside the scope of the plan and, therefore, no specific response is required.

2.2.14 Compliance with Regulations

2.2.14.1 Other Federal Regulations

Summary of Comments

Some of the commenters in this category asked that a full Environmental Impact Statement be prepared for this project. Others asked that the project be compliant with the Endangered Species Act, and listed the habitat requirements for bull trout in particular. A few others requested compliance with the Clean Water Act, and specifically the TMDL process.

Response

Under CERCLA, the RI/FS process, through preparation of a *Record of Decision*, is comparable to the National Environmental Policy Act (NEPA) process. By law, EPA is not required to conduct an EIS for Superfund projects. A biological assessment for bull trout, bald eagle and other endangered species has been prepared, reviewed, and approved by the appropriate Federal Trustees (CH2M HILL 2004a and 2004b). USFWS issued a Biological Opinion supporting EPA's conclusions (USFWS 2004). EPA is obligated to comply with Section 121 of CERCLA, which addresses compliance with applicable or relevant and appropriate requirements (ARARs). Compliance with the Clean Water Act is an ARAR. EPA believes that the remedy is a necessary step in attaining a clean and healthful environment (ARAR compliant). When combined with the restoration activities that the State plans to implement, it is believed that a clean and healthful environment will be attained to the fullest extent possible through the Milltown OU into the lower Clark Fork River.

2.2.14.2 Fully Considered Impacts

Summary of Comments

The commenters in this category focused on whether EPA fulfilled all of its obligations for remedy analysis under CERCLA. Most of the commenters felt that EPA had not completed a thorough enough analysis of all of the risks in the remedy. Aspects of particular concern included the risks from leaving some sediments in place, consideration of downstream impacts during construction, use of ICs for groundwater contamination control, and ambiguity of certain parts of the *Proposed Plan* that will be addressed "during the remedial design."

Response

EPA believes it has fulfilled all of its obligations for remedy analysis under the NCP and has conducted a thorough analysis of the risks and benefits from the remedy. This *Record of Decision* contains a more thorough discussion of the sediments left in place, and how certain Area 3 sediments will be isolated from the active river channel and how other restoration activities above Duck Bridge are expected to decrease erosion. Downstream impacts associated with uncontrolled releases of sediments were modeled using HEC 6 to assess mobilization and transport of scoured sediment downstream. This activity resulted in the decision to construct a bypass channel through Area 1 (see Part 2, *Decision Summary*, Section 12) and to pursue certain construction activities on a schedule that coincided with spring runoff. Under the remedy, groundwater ICs will continue until monitoring indicates the arsenic plume has abated to below drinking water standards. Removal of the primary source sediments and the reservoir pool should hasten the arsenic natural attenuation process.

It is not uncommon for details of design strategies to be delayed until the onset of remedial design. EPA has provided as much information as possible, as it discusses the remedy in this *Record of Decision*.

2.2.14.3 RAOs and RAGs

Summary of Comments

One commenter felt that the RAOs and Remedial Goals (RGs) were incomplete because they do not address the Missoula aquifer drinking water supply. Other commenters felt that more "performance standards" were needed in addition to the stated objectives and goals.

Response

EPA disagrees with the comments. The RAOs specifically address expectations for groundwater and surface water quality downstream of the dam as it relates to water quality in the Missoula aquifer. These expectations are discussed in detail in Part 2, *Decision Summary*, Section 8, *Remedial Action Objectives*, of this *Record of Decision*. Surface water and groundwater standards are discussed in Section 12.7, *Performance Standards and Remedial Goals*, of the *Record of Decision*.

2.2.15 Comment Period—Extend Comment Period

Summary of Comments

These commenters requested an extended public comment period.

Response

EPA extended the original comment period an additional 30 days and provided a second opportunity to comment under the *Revised Proposed Plan*, which presented significant changes from the original plan.

2.2.16 Social Impacts

2.2.16.1 Reservoir Recreation

Summary of Comments

Commenters in this category were concerned about the loss of flatwater recreation in the area, and asked that the dam be retained.

Response

This *Record of Decision* requires the removal of Milltown Dam and approximately 2.6 million cubic yards of sediment in an action designed to help protect human health and the environment. Removal of the dam eliminates the reservoir and the flat water resource associated with it. In its place, the Clark Fork and Blackfoot Rivers will be restored to a free flowing state, allowing fish passage (including bull trout) and restoring the natural confluence of the rivers.

2.2.16.2 Two Rivers Park and Facilities

Summary of Comments

Commenters in this category asked for continued access to and use of the Two Rivers Community Park throughout the remediation process. Other commenters expressed their hope that a rail line or haul road would not be built through the park. A few others were concerned that the Kim Williams Trail extension to the Milltown Reservoir would not be completed if the Bandman Flats site is used as a repository.

Response

Implementation of this *Record of Decision* will entail significant construction activities. It is anticipated that some of these activities will impact the Two Rivers Community Park area. Section 12 of Part 2, *Decision Summary*, provides a description and illustrations of the rail spur/loading area, roads, and bypass that are intended for construction. During construction, access to the reservoir by the general public will be very limited. Upon completion of construction, reclamation of park areas and trails will be restored to pre-construction condition by the RPs.

2.2.16.3 Noise, Traffic, and Dust

Summary of Comments

Most people who commented in this category are concerned about the quality of life in Milltown and Bonner during remediation. The increased traffic poses a safety risk, and the noise from haul trucks and equipment will impact the residents and the educational environment at Bonner School. As described in the *Human Health Risks – Air Quality* category, dust could pose a health threat, or at least an annoyance during remediation. A few people indicated that noise, traffic, and dust impacts would indeed occur during the project, but said that the long-term benefits of dam and sediment removal outweigh a few years of inconveniences to the community.

Response

Noise, traffic and dust will be mitigated by the location of the rail spur and train loading dock onto Area 1 as described in the *Revised Proposed Plan*. Most of the comments expressed under this category are addressed in Part 2, *Decision Summary*, Section 12. Equipment will operate and be staged south of the Interstate. Trains will be operating late at night to avoid adding to local traffic congestion and disturbing residents and the educational environment of Bonner School. As discussed previously for another comment, dust will be abated through the use of water. Although dust is not presently considered a health hazard (USEPA 1993b), it can quickly become an annoyance if not addressed through BMPs.

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3 Revised Proposed Plan Comments and Responses

3.1 Overview of Process, Responders, and Stakeholder Comments

A total of **804 people submitted comments**, excluding the Atlantic Richfield Company and NorthWestern Corporation. One person submitted more than one comment document. Therefore, the **total number of comment documents submitted was higher, at 805,** excluding Atlantic Richfield Company and NorthWestern Corporation.

The statistics in this summary **are based on comment documents**—not people. Two basic types of comment documents are recognized:

- **Unique Comment Documents**, such as letters, e-mails, or postcards with additional comments written on them. EPA received a total of **44 unique comment documents** and **2 public meeting transcripts**.
- **Form Letters,** which include such documents as postcards and petitions. EPA received a total of **759 form letters**.

To identify the range of the public represented by the comment documents, this section contains a description of the kinds of form letters received. Later, this section contains a description of the comment documents by commenter type.

3.1.1 Kinds of Form Letters Received

The form letters were grouped by content, as shown below:

- TwoParagraph: Postcard with two paragraphs of text
- BulletList: Postcard with a bulleted list of items
- Petition: Letter from Milltown residents signed in the form of a petition

If someone submitted two different kinds of form letters, for example, a "TwoParagraph" postcard and a "BulletList" postcard, each postcard was counted. That is, each postcard is counted in its group as a separate comment document, rather than just one for the person. The table below shows the number of comment documents received for each of these kinds of form letters.

TABLE 3-4
Number of Commenters for Each Type of Form Letter: Revised Proposed Plan

Group Name	Description	Count
TwoParagraph	Two-paragraph postcard supporting the Revised Proposed Plan	622
BulletList	Postcard supporting the Revised Proposed Plan with a bullet list of desired features	103
Petition	Letter listing concerns with the Selected Remedy that is signed by Milltown residents	34

3.1.2 Comment Documents by Commenter Type

The authors of comment letters were organized into the following commenter types:

- Milltown Residents
- Missoula Residents
- Upstream Residents
- Downstream Interests
- Others
- No Address
- Meeting
- Groups
- Local Government
- Elected Officials
- Natural Resources Trustees
- Corporate Interests
- RPs

The table below presents the numbers of comment documents submitted by each commenter type, including unique comment documents and form letters. The same commenter types were used for this comment analysis as for the *Original Proposed Plan*. Therefore, some of the commenter types show a zero in the table below because that type of person did not comment on the *Revised Proposed Plan*.

TABLE 3-5
Number of Total Comment Documents Received, Listed by Commenter Type: Revised Proposed Plan

Name	Description	Count
Milltown Residents	Milltown Area Residents (Bonner, Piltzville, Turah, Milltown West Riverside)	79
Missoula Residents	Missoula Residents	543
Upstream Residents	Upstream Residents (Drummond, Clinton, Deer Lodge, Garrison, Anaconda, Butte)	9

TABLE 3-5
Number of Total Comment Documents Received, Listed by Commenter Type: Revised Proposed Plan

Name	Description	Count
Downstream Interests	Residents Downstream of Missoula (Frenchtown, Huson, Alberton, Rivulet, Tarkio, Superior)	8
Others	Other individuals from outside the Clark Fork Basin	137
No Address	People who did not supply an address	7
Meeting	Oral comments provided to EPA at meeting or hearing	2
Group	Citizen Groups and Organizations	12
Local Government	City and County Agencies, Conservation District Board	3
Elected Officials	Mayors, senators, representatives, and other elected officials	0
Natural Resources Trustees	Federal, Tribal, and State Trustees	2
Corporate Interests	Corporate entities such as Mountain Water Co., Avista, PPL, etc.	3

3.1.3 Types of Comments Received

All comments received during the comment period were categorized as shown in Exhibit 3-6, *Categories and Subcategories Applied to Stakeholder Comments*. Comments within each comment document were marked and assigned to a specific category and subcategory, regardless of whether the comment document was an e-mail, letter, fax, phone message, or public meeting transcript. These marked and categorized comment documents are available as part of the Administrative Record for this OU. Contact Diana Hammer to request a copy; a copying fee will be applied. Exhibit 3-6 also indicates the number of comments received for each category.

EXHIBIT 3-6
Categories and Subcategories Applied to Stakeholder Comments (Excluding the RPs): Revised Proposed Plan

Categories	Subcategories	Description	Number of Comments
Opinion of Plan	Fully Supports Plan	Supports plan as written	776
	Conditionally Supports Plan	Supports plan, with a few modifications	9
	Needs More Information	Does not support or oppose; needs more info	36
	Opposes Plan	Opposes the plan entirely as written	5
Dam Removal	Remove Dam	Desire dam removal	635
	Do Not Remove Dam	Do not want dam to be removed	3
	Powerhouse	Whether or not powerhouse should be removed with dam	118

EXHIBIT 3-6
Categories and Subcategories Applied to Stakeholder Comments (Excluding the RPs): Revised Proposed Plan

Categories	Subcategories	Description	Number of Comments
Sediment Removal	Remove More Sediment	Remove more than is outlined in the Proposed Plan	11
	Water Quality during Construction	Water quality and treatment of impacted water	6
	River Scour Modeling	Concerns about scour modeling methodology	3
Bandman Flats Repository	Do Not Use Bandman Flats	Do not use Bandman Flats as the sediment repository	1
Opportunity Ponds Repository	Use Opportunity Ponds	Use Opportunity Ponds for sediment repository	758
	Do Not Use Opportunity Ponds	Do not use Opportunity Ponds as sediment repository	2
	Transportation to Opportunity Ponds	Suggestions or concerns about transporting sediment to Opportunity	3
	Lack of Local Involvement	Lack of public involvement and consideration in Opportunity	4
	Impacts to Aquifer	Potential impacts on the aquifer at Opportunity	1
	Mitigation for Disposal	Mitigation to Opportunity for disposing of sediments at Opportunity Ponds	8
	Air Quality in Opportunity	Air quality in Opportunity from blowing dust	1
	Economy of Opportunity	Economic impacts on Opportunity from repository	3
Channel Reconstruction	Backfill Source	Source of sediment for backfill following removal	2
	Design Considerations	Design of channel reconstruction project	127
	Bridge Structures	Impacts on Duck Bridge and other structures	35
Groundwater	Missoula Aquifer	Potential for impacts on Missoula aquifer if sediments are released	3
	Institutional Controls and Monitoring	ICs needed for groundwater use or protection	42
	Loss of Drinking Water Wells	Concern that dam removal will lower water levels	44
Surface Water	Institutional Controls and Monitoring	ICs and monitoring for surface water impacts	4

EXHIBIT 3-6
Categories and Subcategories Applied to Stakeholder Comments (Excluding the RPs): Revised Proposed Plan

Categories	Subcategories	Description	Number of Comments
Human Health Risks	Safety during Construction	Public safety, including traffic, trains, etc.	8
	Contaminants in Groundwater	Risks from groundwater contamination to Milltown residents	114
	Contaminants in Surface Water	*Human exposure to arsenic in surface water*	8
	Air Quality	Air quality impacts during construction	3
Ecological Risks	Wildlife Habitat	Risks to wildlife in the Proposed Plan	6
	Aquatic Health	Risks to aquatic organisms in the Proposed Plan	2
Opinion of EPA	No Mailing List	Request to be removed from mailing list	11
	Public Outreach Effectiveness	Degree to which EPA's public outreach was successful	2
Economic Impacts	Property Values	Value of properties adjacent to project	43
	Payment for Cleanup	Who should pay for the cleanup	3
	Community Economic Changes	Economic impacts or changes in surrounding communities	46
	Water Rights	Use of water rights during and after the remedy	1
Comment Noted	No Response Required	No response needed because comment is an opinion	20
Compliance with Regulations	Other Federal Regulations	Compliance with ESA and other regulations	1
	Fully Considered Impacts	EPA's considerations of all impacts under CERCLA	4
	RAOs and RAGs	Appropriateness of goals and objectives	2
Social Impacts	Reservoir Recreation	Reservoir recreation impacts	2
	Noise, Traffic, Dust, and Odors	Impacts to the public during construction	44
	Controlled Public Access	Public access during construction for observation	5
	Historical Documentation	Document the historical resources and the dam removal	5
Cooperation among Agencies	Favors Integration with Other Agency Plans	Favors integration of the selected remedy with restoration	795
Third Party Interests	Upstream Impact Concerns	Impact concerns upstream, particularly Opportunity	1
	Downstream Impact Concerns	Impact concerns of parties downstream of the action	5

3.2 Stakeholder Comments and Responses

This section is organized by category as shown in Exhibit 3-6. The subcategories are listed under each category. Within each subcategory, a summary of the comments is provided, along with the lead agencies' response.

3.2.1 Opinion of Plan

3.2.1.1 Fully Supports Plan

Summary of Comments

Comments in this category stated full support of the *Revised Proposed Plan*. Respondents provided many reasons for supporting the Milltown Dam and sediment removal. Many expressed enthusiasm for stream restoration, achievement of fish passage, improvement of conditions for aquatic life, restoration of polluted surface water and groundwater, and improvement of safety by removing an old dam structure. Some of the supporters urged EPA to move forward as quickly as possible with the *Revised Proposed Plan* remedy.

Response

EPA acknowledges the full support of more than 770 commenters for the *Revised Proposed Plan's* recommended remedy, representing approximately 97 percent of commenters.

3.2.1.2 Conditionally Supports Plan

Summary of Comments

These commenters would fully support the *Revised Proposed Plan*, but their approvals were expressed with suggestions for modifications that they believe would make the remedy more complete, such as the following:

- Proceeding with the project in spite of what they perceive is an incomplete risk assessment on impacts to downstream users.
- Impacts related to reservoir drawdown on residents' homes adjacent to the Clark Fork and Blackfoot Rivers in the Milltown area.

Despite such qualifications, support for the remedy was generally expressed by these commenters.

Response

EPA examined these comments and included additional detail in the *Record of Decision* to address these issues. EPA is very concerned about the risk to downstream receptors and has engaged in a number of activities to evaluate those risks. For example, during development of the final remedy, EPA required Atlantic Richfield Company to complete an extensive surface water modeling effort (using HEC 6) to predict the amount of sediment scour the remedial activities would generate and transport downstream under specific options. The modeling approach and results were reviewed by a panel of national experts. Their opinions resulted in EPA requiring a Clark Fork River bypass channel to reduce contaminated sediment scour potential and adjusting major sediment-yielding field activities (such as dam removal) so they coincide with spring runoff. These changes will reduce the risk of generating large volumes of contaminated sediment that would be transported to depositional areas downstream, such as Thompson Falls or Noxon Reservoirs. EPA believes that changing the local environment from a reservoir to an active river channel, removal of the source sediments, and physical isolation of those sediments that contain lower levels of contamination is the most prudent approach for safeguarding human health and the environment risk at the reservoir and downstream.

EPA understands the concerns of adjacent property owners over eliminating the reservoir and the dam, and is committed to working with residents to help mitigate significant impacts through remedial design. Implementation of the restoration plan will provide significant enhancements to the area as well.

3.2.1.3 Needs More Information

Summary of Comments

Commenters in this category did not support or oppose the *Revised Proposed Plan*, but felt that more information would be needed to make a determination for themselves. Others asked for clarification on whether or not restoration efforts would be made on the Blackfoot arm of the project upstream of the Interstate bridge to Stimson Dam.

Response

Proposed plans are normally general in nature. EPA supplemented the *Revised Proposed Plan* with specific answers to questions raised during the *Original Proposed Plan*, to ensure that the public had adequate information during the public comment period. This *Record of Decision* contains details on the issues that commenters identified as too vague in the *Revised Proposed Plan*. Some restoration is planned by the State for the reach of the Blackfoot River up to the Stimson Dam, and a USFWS fish passage project will include the removal of the Stimson Dam, which will be conducted in concert with the Milltown remedial activities (see Part 2, *Decision Summary*, Section 12.3.2). The State's NRDP will direct and fund other restoration activities beyond the MRSOU boundaries.

3.2.1.4 Opposes Plan

Summary of Comments

These commenters were completely opposed to both dam and sediment removal as described in the *Revised Proposed Plan*. Not many reasons were given for respondents opposing the plan, other than they were against total dam removal including the powerhouse, sediment removal and storage at Opportunity Repository, diverting the Clark Fork River into a bypass channel during clean-up activities, and combining clean-up and restoration for cost savings. One respondent felt that the *Revised Proposed Plan* was a complete waste of tax payers dollars.

Response

EPA notes opposition to the *Original Proposed Plan*, but believes that the remedial action described in this *Record of Decision* meets the threshold criteria for remedy selection, and provides the best balance among the remaining balancing and modifying criteria. Issues such as historic preservation of the powerhouse, explanation of the sediment removal methods and their transport to Opportunity Ponds, incorporating a bypass channel into the remedial activities, and combining remedial action with some restoration activities are presented an discussed in detail in Part 2, *Decision Summary*, Section 12.

3.2.2 Dam Removal

3.2.2.1 Remove Dam

Summary of Comments

Comments in this category focused specifically on dam and sediment removal. These commenters generally had the same reasons for supporting dam removal as described in the *Fully Supports Plan* subcategory.

Response

EPA agrees with the comments expressing support for the removal of the dam. As explained in Part 2, *Decision Summary*, of this *Record of Decision*, EPA believes the remedy will restore the contaminated Milltown aquifer, restore fish passage, improve the overall aquatic environment, and significantly reduce the potential risk of future impacts to aquatic life from the scour of sediment left onsite.

3.2.2.2 Do Not Remove Dam

Summary of Comments

Several commenters advocated leaving the dam in place primarily because of its historic significance. One comment discussed a previous survey authorized by the Missoula Health Department and conducted by the University of Montana in which respondents wanted the dam to be left in place. Another comment expressed essentially the same reasons for not supporting dam removal as described in the *Opposes Plan* subcategory.

Response

EPA acknowledges the comments to retain the dam. However, as explained in the previous set of comments for the *Original Proposed Plan* (see Section 2.2.2.2, *Do Not Remove Dam*, of this *Responsiveness Summary*), EPA is required under the Superfund law to seek a remedy that provides a permanent, long-term solution that is protective of public health and the environment. Leaving the dam in place would allow additional sediments to accumulate and would likely continue polluting the local drinking water aquifer. In effect, the situation could revert back to its pre-removal condition. That is not in the best interest of the community or acceptable under CERCLA.

3.2.2.3 Powerhouse

Summary of Comments

Many of the commenters advocated total dam removal including the powerhouse. Some of these commenters view the removal of the dam and powerhouse as an important component to natural channel restoration but also recognize the historical significance of the powerhouse and suggest that the history of the powerhouse be preserved at an offsite interpretive center. One respondent would like the powerhouse to remain as a historic structure citing its historic value and eligibility for the NRHP, and stating that the Milltown powerhouse does not pose a threat to human health, the environment, or impede fish passage. Other comments recognize the financial and operation and maintenance burden of keeping the powerhouse complex in place given its proximity to the river channel.

Response

EPA acknowledges a diversity of opinions on how to deal with the powerhouse and affiliated dam structures. As discussed in comments to the *Original Proposed Plan* (see Section 2.2.2.3, *Powerhouse*, of this *Responsiveness Summary*), EPA agrees with and understands the historic significance of the dam complex, but has determined with input from the State of Montana that the Milltown Dam will be completely removed as part of the CERCLA action at the site. Mitigation measures consistent with the NHPA will be developed and applied. More detailed information is contained in Part 2, *Decision Summary*, Section 5.7, of this *Record of Decision*. In addition, Milltown Redevelopment Group, a local community redevelopment group, is examining possible ways to recognize and celebrate the historical significance of the dam, powerhouse, and river confluence.

3.2.3 Sediment Removal

3.2.3.1 Remove More Sediment

Summary of Comments

Commenters in this category expressed concern that leaving contaminated sediment in place could, under certain circumstances, create new problems downstream. The sediments of concern were those associated with Area 3 (the old Clark Fork River channel). Some of these commenters would like removal of additional contaminated sediment from Area 3 to address potential short and long-term impacts for both surface water and groundwater. One commenter cited more permanence and less engineering controls to prevent future erosion of sediments downstream if additional sediment were to be removed from Area 3.

Response

Comments on the *Original Proposed Plan* raised some of the similar concerns (see Section 2.2.2.4, *Remove More Sediment*, of this *Responsiveness Summary*). EPA believes that contaminated sediments in Area 3 can be successfully isolated from the floodplain by utilizing engineering controls, and diverting the river away from those sediments into Area 1 (where all sediments were excavated). A newly constructed, free-flowing channel would be designed to accommodate a seasonally fluctuating flow regime, and would occupy a reconstructed, functional floodplain through the project area. Elimination of the reservoir pool is anticipated to influence local water table levels, by dropping them to pre-reservoir elevations. Groundwater levels are also expected to fluctuate seasonally throughout the area after remedy implementation. Lower level contaminants underlying the existing Clark Fork River channel may or may not be intercepted by the new groundwater levels. At this time, EPA does not anticipate any new groundwater impacts from this material. Groundwater flow paths are likely to intercept or parallel the river. In both cases, dilution is expected. EPA believes that through design, a natural floodplain with healthy riparian vegetation can be established that would accommodate a variety of hydrologic regimes without unacceptably liberating contaminants. Removal of all the sediments (Areas 3, 4, and 5), as suggested by commenters, is not cost-effective, and therefore it was not retained as an option.

3.2.3.2 Water Quality during Construction

Summary of Comments

Comments under this category expressed concern that water quality downstream will suffer during construction, in spite of the BMPs and construction barriers that will be used. A few commenters indicated that all process water may need to be treated before returning it to the river. Several people were also concerned about the construction and design of the bypass channel and how it will mitigate or control toxic sediments, high spring water flow, and ice jams.

Response

Similar comments were expressed on the *Original Proposed Plan* (see Section 2.2.3.3, *Water Quality during Dredging*, of this *Responsiveness Summary*). However, under the *Revised Proposed Plan*, the proposed method for sediment removal is "dry" excavation. Removal of the Milltown Dam early in the construction will reduce local groundwater elevations to allow for the dry excavation of most, if not all, of the targeted sediment. Implementation of construction BMPs during dry excavation provides more control of the sediment and reduces the likelihood of uncontrolled releases to the river that might affect downstream water quality. Construction of the bypass will occur with the Clark Fork River in its current channel. The bypass channel will be designed to handle a 100-year flood, which should allow the channel to pass ice during the winter. EPA has consulted with USACE experts on the formation of ice jams, and how best to design for their passage. The bypass channel will also be armored to significantly reduce scouring of contaminated channel bottom sediments from Area 1 and will help control erosion issues associated with seasonal flow regimes for the duration of project construction. Sequencing of the dam removals and opening of the bypass will be timed to coincide with spring runoff to help mitigate any potential scour of sediments. Drainage water from moist sediment will be carefully and frequently analyzed and compared to EPA's temporary water quality standards. If those standards are exceeded, seepage water will be treated to remove the contaminants before being discharged to the river. EPA believes that through careful design and implementation of the remedy, downstream water quality will be preserved.

3.2.3.3 River Scour Modeling

Summary of Comments

One commenter expressed several concerns with using HEC 6 to estimate sediment erosion and deposition associated with the removal of Milltown Dam. The commenter listed several limitations of HEC 6 and of the selected modeling equation and parameters. The commenter noted that HEC 6 is a one-dimensional model and unable to predict erosion from channel widening and upstream headcut migration. The commenter also expressed concerns associated with the selection of Yang's equation and parameters used to estimate erosion rates of silt and clay. A couple of commenters felt that modeling flood events only up to the 25-year event was inadequate and that sediment erosion estimates should be determined for more extreme floods. Others expressed concerns about the potential for impacts to downstream impoundments such as Thompson Falls Reservoir.

Response

As noted by the commenters, the *Final Technical Memorandum: Milltown Reservoir Dry Removal Scour Evaluation*, clearly acknowledges and discusses the limitations of HEC 6.

Because of these limitations and the complexity of estimating sediment erosion, EPA had several sediment transport experts review the modeling results. These experts included sediment transport researchers and modelers from the U.S. Bureau of Reclamation, USACE, EPA, and private consulting firms. Several of these reviewers had been involved in model evaluations of previous dam removals. These reviewers were satisfied that the model results were adequate for their intended purpose. The intent of the model results was to estimate potential worst-case conditions and for comparison of various alternatives. Erosion equations and parameters were selected using these criteria. For example, the selected critical shear stress for mobilizing cohesive sediment was low enough that generally all the sediment was predicted to be eroded regardless of the specific value selected. Therefore, efforts to refine the specific critical shear stress were not merited. Volume computations of available sediment based on channel geometry were also performed to support HEC 6 model estimations. The scour modeling results are discussed in detail in Part 2, *Decision Summary*, Section 12.4, *Control of Sediment Releases during Construction*.

The merits of evaluating floods greater than the 25-year event are discussed in *Final Technical Memorandum: Milltown Reservoir Dry Removal Scour Evaluation*. Based on model sensitivity analysis and conservative erosion predictions, it is estimated that flood events greater than the 25-year event will have a dilution effect because likely increases in flow would exceed the increases in sediment load. It should also be noted that the selected bypass alternative will be designed to control flows up to the 100-year event.

The scour modeling effort did provide some input into the potential for sediment and associated copper and arsenic loads to be transported to downstream impoundments. Assuming the sediment scoured from the Milltown Reservoir and sediment loads from all interim tributaries (Bitterroot river, Flathead River, etc.) reach the Thompson Falls Reservoir over 4 years of remedial construction at Milltown, the total load contribution is predicted to be approximately 2.2 million tons. Of this amount, 0.3 million tons (or 13 to 14 percent) is predicted to come from Milltown reservoir activities. EPA believes this prediction may be conservative (over-estimating the impact of the Milltown activities) given the model used and its inherent operating assumptions. Given the fine-grained size of suspended sediment from Milltown, it is likely that much of the sediment would pass through, rather than deposit in, the Thompson Falls Reservoir.

The average copper and arsenic concentrations associated with the scoured Milltown sediment is estimated to be 232 mg/kg and 34 mg/kg, respectively. Mixed with sediment source material from other tributaries, the average copper and arsenic concentrations as it enters Thompson Falls Reservoir is estimated to be approximately 106 mg/kg and 25 mg/kg, respectively (based on a weighted average of the predicted sediment loads from the major sources calculated over the 4-year excavation period). For comparison, the estimated total copper and arsenic in Thompson Falls Reservoir sediments, estimated in 1985, is about 108 mg/kg and 19.3 mg/kg, respectively, based on work completed by University of Montana researchers Johns and Moore (*Copper, Zinc and Arsenic in Bottom Sediments of Clark Fork River Reservoirs*). The predicted 4-year load (construction period) of copper potentially entering the reservoir from all sources is estimated to be 264 tons. Of this amount, 26 percent is predicted to come from the scour of Milltown sediments. Arsenic is similar. Of the predicted 63 tons estimated to enter the Thompson Falls reservoir, 16 percent is predicted to have its origin in Milltown. It should be noted that the Milltown contribution to this downstream load is estimated to occur over a 4-year period, whereas loading from other natural sources will continue indefinitely. Thus, if viewed over the long-term, the potential Milltown contribution becomes relatively small and probably insignificant.

3.2.4 Bandman Flats Repository

3.2.4.1 Do Not Use Bandman Flats

Summary of Comments

A comment received supported moving sediment from the proposed Bandman Flats area to Opportunity Ponds for cover material, which makes the land available for development.

Response

EPA appreciates the comment and concurs with the commenter's approval of transporting the excavated sediments to Opportunity Ponds. EPA also agrees that when possible, it is preferable to use existing repositories rather than creating new places to store excavated material.

3.2.5 Opportunity Ponds Repository

3.2.5.1 Use Opportunity Ponds

Summary of Comments

The comments associated with this category supported using the Opportunity Ponds repository. Transporting the sediment material by rail to Opportunity Ponds was viewed positively by most commenters. Some commenters indicated that Opportunity Ponds is already an impacted area and existing repository, so the addition of more contaminated sediment (approximately 1 percent) to the overall volume of contaminated material is not a critical issue. Furthermore, many commenters support using the sediment material as a cap for Opportunity Ponds. One respondent recommended that the capped or topsoil material exposed to erosion from air or precipitation be addressed.

Response

EPA concurs with the use of the Opportunity Ponds as the primary repository. The sediment proposed for disposal (the exact amount will be determined during design) represents less than 1 percent of the total waste materials currently disposed of at the Opportunity Ponds. In addition, its high organic matter may allow it to be used as part of an effective capping medium. Once placed, the cap materials will be treated if necessary and re-vegetated with selected native species to reduce the potential for wind and water erosion. In fact, this re-vegetated cap will improve the current conditions that allow occasional wind and water erosion of the materials currently disposed of at the Opportunity Ponds. In addition, use of these sediments as capping material greatly reduces the need for digging borrow pits for capping soil in the Anaconda area.

3.2.5.2 Do Not Use Opportunity Ponds

Summary of Comments

A comment in this category voiced no support for disposing of the Milltown sediments at Opportunity. In the commenter's eyes, Opportunity has been the dumping ground for the

Clark Fork basin and very little attention has been paid to local residents who must ultimately live with it, but certainly did not voice public acceptance of the idea.

Response

EPA acknowledges the concern of the residents of the Opportunity and Anaconda area. EPA has evaluated a number of potential repository locations during the course of preparation of the *Feasibility Study*, the *Proposed Plan*, and this *Record of Decision*, and has determined that disposal at Opportunity Ponds best meets the threshold and balancing evaluation criteria while significantly reducing human health and environmental risks. The Opportunity Ponds are located on Atlantic Richfield Company property, and appropriate controls will be placed on this area as part of the Anaconda remedy so that disposal of the sediments can be done safely and effectively.

3.2.5.3 Transportation to Opportunity Ponds

Summary of Comments

Comments in this category generally support the proposed location for rail car loading and using rail to transport sediment to Opportunity Ponds. However, one respondent stipulates that the only acceptable timeframe for train travel is after 6:00 PM to pass through Grant Kohrs Historic Ranch. This commenter expects Atlantic Richfield Company to prepare a Spill Prevention, Control and Countermeasure (SPCC) Plan and a fire suppression plan subject to review and approval. In addition, this commenter recommended the scope of the existing Clark Fork/Flathead Basin Sub Area Contingency Plan be expanded upstream to cover at least the reach of the Clark Fork River from Missoula County line to Anaconda, and address the potential spill of contaminated sediments.

Response

EPA concurs that rail transport is safe, effective, and the most cost-effective method to transport the sediments to Opportunity Ponds. The sediments will be dewatered prior to transport and will be covered during transport, so there will be minimal risk of spillage. The trains carrying the sediments will be unit trains and will travel at night to minimize traffic conflicts and impacts to communities as well as the Grant Kohrs Historic Ranch. A Health and Safety Plan will be developed to minimize risks to human health and the environment (including risks resulting from fire and spillage) during transport. An SPCC Plan will be developed if there is storage of oil or petroleum products associated with the transport system in excess of the regulatory threshold of 1,320 gallons. These plans should be sufficient to address risks and spills during rail haul of the excavated sediments.

3.2.5.4 Lack of Local Involvement

Summary of Comments

Comments in this category express concern for effects to human health and the environment for the residents of Opportunity from sediment proposed to be deposited into the Opportunity repository.

Response

The sediments that will be deposited at Opportunity Ponds do not represent a risk to human health or the environment in the vicinity of Opportunity. In fact, the use of the sediments at the ponds may reduce the current minimal risks to human health and the environment associated with wind and water erosion of the existing tailings materials currently deposited at the Opportunity Ponds. Use of the sediments as capping material could reduce the need for additional capping soil borrow pits which would create less disturbance in the Opportunity area.

3.2.5.5 Impacts to Aquifer

Summary of Comments

A comment was received concerning groundwater impacts to the local aquifer that serves as the drinking water source for the town of Opportunity. The commenter notes that the Opportunity Ponds are supposed to be sealed, but is concerned that the seal might fail as more wastes are received from sites like Milltown.

Response

EPA acknowledges Milltown's contribution to the Opportunity Ponds, which amounts to less than 1 percent of the waste onsite. The sediments that will be deposited do not represent any increased risk to the aquifer in the vicinity of Opportunity. This is because the arsenic in these sediments is more mobile under reducing (oxygen deficit) conditions or high pH. The sediments may be used as a cap and may therefore be spread over the surface of the Opportunity Ponds in a comparatively thin layer, generally not more than 1 to 2 feet deep, if standards are met. Groundwater at the perimeter of the site will be monitored and if necessary, treatment will be required. The thin layer of these sediments will be in an oxidized state that immobilizes the arsenic, therefore resulting in minimal risk for transport of arsenic into the aquifer. The re-vegetation of the cap materials will result in increased surface evapotranspiration and decreased infiltration into the underlying waste materials, actually reducing the risks to the aquifer associated with the underlying existing waste materials.

3.2.5.6 Mitigation for Disposal

Summary of Comments

Comments in this category support mitigation disposal measures for the community of Opportunity. Many citizens of Opportunity would like to see some economic benefit in return for the contaminated sediment proposed to be disposed of in the Opportunity repository. In addition, one respondent pointed out that the citizens of Opportunity would like their concerns addressed regarding "contamination from wind-blown dust, domestic water supplies, and their community being perceived of as a dumping ground."

Response

There will be significant economic benefits for the residents of the Clark Fork Valley (including Opportunity) during the period of implementation of the remedy. The benefits at Opportunity will be primarily associated with job opportunities resulting from the construction of the cap incorporating the transported sediments from Milltown Dam. As noted previously, there will be no increased risk to the aquifer associated with deposition of the sediment materials. In fact, the use of the sediments in a vegetated cap, if that is approved, will reduce the current risks to human health and the environment associated with wind and water erosion of the existing tailings materials currently deposited at the Opportunity Ponds. Also, as part of long-term monitoring for the Anaconda site, domestic wells will be monitored for exceedances of water quality standards.

3.2.5.7 Air Quality in Opportunity

Summary of Comments

A citizen of Opportunity is concerned about air quality issues downwind of the Opportunity repository. Apparently a "very yellow, foul-looking dust" covered one side of a local residence house during a past wind storm. The citizen proposed to have the material covered to avoid future wind events.

Response

The high organic matter in the sediments transported to the Opportunity Ponds may allow it to be used in an effective capping medium on the Ponds. Once placed, the cap materials will be treated, if necessary, and re-vegetated with selected native species to reduce the potential for wind erosion. In fact, this re-vegetated cap will improve the current conditions that allow occasional wind erosion of the materials currently disposed of at the Opportunity Ponds.

3.2.5.8 Economy of Opportunity

Summary of Comments

Several respondents expressed concern about the short term positive economic impacts versus the long term negative impacts of having the repository located at Opportunity.

Response

EPA agrees that the short term economic benefits to Opportunity will be primarily from jobs associated with transport of the sediments and construction of the cap. Therefore, the short term benefits will extend only for the 5 to 7 years associated with implementation of the remedy. However, the quantity of the materials transported from the Milltown area represent less than 1 percent of the total materials currently deposited at Opportunity Ponds; therefore they do not represent a significant increase in the negative impacts associated with the location of the repository at Opportunity. Use of these sediments would also reduce the need for additional borrow pits in the Opportunity area. In fact, the construction of the cap, if that occurs with the sediments, will result in long term benefits associated with reduced wind erosion of the existing waste materials and improvement to visual resources associated with re-vegetation of the surface of the ponds.

3.2.6 Channel Reconstruction

3.2.6.1 Backfill Source

Summary of Comments

Comments in this category express concern about the amount of clean fill material that is needed for channel and floodplain reconfiguration. One person asked, where will additional material would come from and how it would be transported if the Sheriff Posse and Bonner Development Group properties do not have enough gravel material needed for the project. Another comment indicated that preliminary discussions with Atlantic Richfield Company are underway for the use of clean fill material, but that no formal agreement has been finalized.

Response

The rodeo grounds is proposed as the source of much of the borrow material to be used for floodplain construction. Most of the detailed decisions regarding specific sources for borrow material will be made and confirmed during the remedial design phase of the project. Preliminary estimates indicate an adequate volume for construction.

3.2.6.2 Design Considerations

Summary of Comments

Comments in this category were directed to both the bypass and the new channel designs. Favorable comments were received in response to diverting the Clark Fork River into a bypass channel during cleanup to reduce sediment releases from the reservoir and river channels. However, some commenters were concerned about having an adequate channel design capacity to control high flows and ice scouring during construction and restoration activities. One respondent recommended performing a risk assessment through a process called the Failure Modes and Effects Analysis. This analysis is commonly used to prioritize and manage the implementation of risk reduction measures during dam and sediment removal.

A variety of comments also emphasized the importance of completing a proper river channel design and coordinating it with restoration activities. Comments suggested less "hard engineering" be used and restoration ideas be included in the remedial design to create a natural river through the area. Other comments raised the concern about properly using drop structures to reduce headcutting and appreciated clarification of this topic during the public meeting. Another comment voiced concern that the gradient remediation structures need to be safe to allow for eventual public recreation activities on the river through the former Milltown and Stimson dam locations. Maintaining a high water elevation above Duck Bridge and retaining a shallow gradient from the Blackfoot River up to Duck Bridge were both suggested to protect wetland and riparian areas above Duck Bridge. Another recommendation involved using a HECRAS engineering hydraulic analysis to document the effects when removing the Milltown and Stimson dams, as well as providing results of the channel/floodplain modifications.

Institutional controls were also proposed for the new channel. For example, the installation of several weirs in the channel was suggested to monitor water loss. Concerns about flood and erosion control and ultimately the movement of contaminated sediment were stated. A comment also suggested that bentonite be used at some point during the project to prevent water from seeping into the aquifer.

Response

The conceptual design for the bypass channel is presented in Part 2, *Decision Summary*, Section 12.3.1, *Bypass Construction*. The channel will be designed with the capacity to handle a 100-year flood. The channel will be armored to reduce the potential for erosion while in use. Specific details of the bypass design will be prepared during the remedial design phase. The design of these conveyance features will be prepared by water resource and geotechnical engineers. On behalf of EPA, water resource engineers with the USACE will provide technical oversight to make sure design specifications comply with state of the practice principles. The risk inherent to the final design will be evaluated by these experts, who will specify their method of analyses (may or may not include the Failure Mode Effects Analysis), before any implementation or construction of the remedy occurs.

A new channel and floodplain for the Clark Fork River will be constructed extending from Duck Bridge to the new confluence with the Blackfoot River. The new channel will reflect a "restoration" design that matches a natural meander pattern with a sustainable gradient and adequate design capacity to handle the seasonal flow regimes. Where possible, natural materials will be used for construction purposes to dissipate energy and accommodate the required fluctuations in flow regime as described in Part 2, *Decision Summary*, Section 12.3.8, of this *Record of Decision*. The State will complete channel and floodplain restoration work upstream of Duck Bridge, transitioning the Clark Fork River channel and floodplain into the primary remediation project area. This restoration work will eliminate the need for drop structures at Duck Bridge. Details relative to the State's plan were presented in *Restoration of the Clark Fork and Blackfoot Rivers near Milltown Dam* (State of Montana, Natural Resource Damage Program, May 2003) and *Amendment to the Draft Conceptual Restoration Plan for the Clark Fork and Blackfoot Rivers near Milltown Dam* (State of Montana, Natural Resource Damage Program, June 9, 2004). Public comments on the plan were answered and addressed by the State in the amendment.

EPA has worked with the Trustees to provide close coordination between the remediation and restoration plans within the primary remediation project area (the area from the dam to Duck Bridge on the Clark Fork River arm of the reservoir and to the Interstate Bridge on the Blackfoot River arm). Because the remediation and restoration plans must be closely integrated within the remediation project area, the restoration aspects of the project were incorporated into the figures that appear in Part 2, *Decision Summary*, Section 12, of this *Record of Decision*. The coordinated restoration elements include the following:

- Removal of the divider block/power house/north (right) abutment
- Changes in the floodplain and channel alignment
- Implementation of soft stabilization/revegetation techniques to stabilize the channel

Another project associated with this action is the removal of the Stimson Dam, which is being planned as a cooperative effort through the USFWS National Fish Passage Program with matching funds.

EPA shares the concern that final design of the channel include a component that will remove existing channel features (such as the timber cribs that functioned as log raft tie-offs upstream of the Stimson Dam) that would present a safety hazard to recreational users of the river.

3.2.6.3 Bridge Structures

Summary of Comments

A comment expressed concern about whether or not the concrete bridge piers in the Blackfoot River below Stimson Dam will be removed or left in place. More specifically, the commenter asked what the risks are to these structures by lowering the water level, and what, if any, investigations have been completed.

Response

Undermining the structural integrity of existing bridges and piers through implementation of remedial activities are also concerns of EPA. These issues will be resolved through engineering analysis of the changed conditions during remedial design. If necessary, modification to the designs of the existing bridges and piers will be implemented and/or grade control structures will be installed to prevent additional scouring. Atlantic Richfield Company's technical team has also recognized these issues as concerns. Designs will be carefully reviewed by the structural and hydraulic engineers of EPA's contractor and by the USACE before authorization to proceed is provided.

3.2.7 Groundwater

3.2.7.1 Missoula Aquifer

Summary of Comments

Comments in this category expressed concern that the Selected Remedy may contaminate the Missoula aquifer—a sole source aquifer. Concern was expressed about the potential for a rise in surface and groundwater contamination resulting from the excavation of contaminated sediment. Transport of contaminants downstream through Hellgate Canyon where the Clark Fork River becomes a losing reach and recharges the Missoula aquifer was specifically cited as a concern. Exposure of the alluvium underlying the Milltown sediments and enhancing its ability to transport contaminated water into the local groundwater was also mentioned.

Response

Comments on the *Original Proposed Plan* (see Section 2.2.7.2, *Missoula Aquifer*, of this *Responsiveness Summary*) reflect similar concerns and questions relative to the Missoula Sole Source Aquifer. Our response to those comments are also applicable to these comments, and therefore repeated here: EPA is committed to safeguarding the potable water supply of the Missoula Sole Source Aquifer. EPA has conducted surface water quality modeling (P. Schroeder, USACE, 12-31-01 Memo to EPA; Final Tech Memo Milltown Reservoir Dry Removal Scour Evaluation, Envirocon, May 17, 2004) to evaluate the potential impact on surface water and has concluded that no impact is likely on the Missoula Sole Source Aquifer from remedial activities proposed as part of the Milltown cleanup. Furthermore, EPA proposes extensive and frequent monitoring of both surface and groundwater to gage the status of water quality during the construction activities, and the *Record of Decision* provides for replacing water supplies that are unexpectedly contaminated during remedial implementation.

3.2.7.2 Institutional Controls and Monitoring

Summary of Comments

Comments in this category asked that EPA continue to frequently monitor existing Milltown wells, set up a comprehensive groundwater monitoring system that extends below the Deer Creek USGS station, and identify the criteria for monitoring well locations and monitoring frequency, as well as discuss what steps will be taken if an impact to groundwater is identified and develop a contingency plan that can be implemented in the event that the water supply becomes contaminated.

Response

Part 2, *Decision Summary,* Section 12.5, discusses the surface water and groundwater monitoring to be employed during and after construction. It is anticipated that modifications to increase their effectiveness will be made to these networks during the remedial design phase. The goal is to have a comprehensive system that allows real time monitoring so managers will be alerted to construction related upsets and be able to make adjustments that mitigate unacceptable conditions. In terms of defining specific contingencies in the event a water supply becomes contaminated, the *Record of Decision* provides for replacing water supplies that are unexpectedly contaminated during remedial implementation.

3.2.7.3 Loss of Drinking Water Wells

Summary of Comments

Comments in this category expressed concern that irrigation and domestic wells may be adversely impacted if the river water levels are lowered. Many respondents are concerned that not enough water will be available for irrigation purposes and that this reduction would affect their water rights. Others are concerned that domestic wells will dry up (in terms of quantity as well as water quality), and that they would need compensation for deepening a well or drilling a new well. Others are concerned about contamination to shallow domestic wells. A few also called for a contingency plan to address the potential loss of water table and contamination impacts. One respondent suggested the water level in Area 5 (above Duck Bridge) should be maintained at or above the current low water level so as not to adversely impact domestic water wells.

Response

As discussed in the previous section (Section 3.2.7.2), EPA will monitor groundwater elevations during construction, and believes direct mitigation to impacted wells is appropriate. EPA does not believe that implementation of the remedy will lead to expansion of the groundwater plume. On the contrary, EPA anticipates an improvement in water quality in the local aquifer in a relatively short period of time (4 to 10 years).

3.2.8 Surface Water

3.2.8.1 Institutional Controls and Monitoring

Summary of Comments

Comments in this category expressed concern for both short-term and long-term surface water quality monitoring downstream of Milltown dam. Several comments state that monitoring needs to extend much farther than the proposed 2.8 mile stretch downstream of Milltown dam. A recommendation was made for monitoring at the next series of Clark Fork River dams (i.e., Thompson Falls, Noxon, and Cabinet George). At a minimum, it was recommended that costs for including metals in the suite of analytes presently sampled downstream as part of the Clark Fork River basin-wide sampling program be added to the cost of the project.

Response

Under this *Record of Decision*, the reservoir is eliminated, groundwater levels are reduced, sediment scour during construction by the active Clark Fork and Blackfoot Rivers will be minimized with use of the bypass, and major field activities will be scheduled to coincide with spring runoff. Hence, the source of dissolved and total recoverable arsenic associated with the total suspended solids loads, speculated to infiltrate from surface water into the local Milltown aquifer and the Missoula sole source aquifer below Hellgate Canyon and move downstream to other reservoirs, is greatly diminished by the change in the sediment removal method. EPA will have comprehensive surface water quality and groundwater (see response to comment 3.2.7.2) monitoring programs during the project that compare predetermined standards to existing water quality data. Periodic monitoring immediately upstream of Thompson Falls will be performed, but monitoring at Noxon, and Cabinet Gorge is not anticipated as part of the remedy, given the engineering controls and comprehensive local monitoring planned for the project. Vigilant local monitoring will be a cornerstone of early detection of problems and making appropriate adjustments to mitigate any potential impacts. Based on extensive modeling (water quality and sediment scour) and the planned BMPs, EPA believes that the remedy does not pose a threat to the sole source Missoula aquifer or nor the downstream Clark Fork River resources.

3.2.9 Human Health Risks

3.2.9.1 Safety During Construction

Summary of Comments

There were many comments on public safety related to train traffic (location of loading areas), interstate traffic, and precautions for children and the general public who want to view progress of the project. One respondent suggested working together with the EPA, local groups, and residents to establish a safety and traffic control plan.

Response

EPA is also very concerned about safety during implementation of the remedial actions. The RPs and their contractors will be required to develop detailed Health and Safety Plans to address these concerns, including traffic and public safety, prior to implementation of the remedy. In response to safety concerns, the proposed railcar loading areas have been relocated away from town to the river side of the Interstate. EPA anticipates that truck and local traffic planning will be coordinated through County and City officials before being implemented to help minimize impacts on local residents. Travel routes for mobilizing equipment will be publicized ahead of time to notify the community of travel corridors that will be used. Through a careful planning process, construction risks can be managed to avoid injury. EPA will consider implementing a program of sponsoring guided site tours for school children and for the general public, so that the public can view the progress of construction of remedial actions in a safe and supervised manner.

3.2.9.2 Contaminants in Groundwater

Summary of Comments

Concern about the potential for adverse impacts on the Milltown aquifer resulted in a number of comments. One respondent is concerned that other groundwater studies conducted by independent sources show results that may further degrade the aquifer in the Milltown area and may take additional time to clean up. A few were also concerned that the proposed new channel might impact the aquifer with contaminated river water during excavation activities across the aquifer. One commenter also raised concern about infiltration damage to the aquifer during reconstruction activities for the wetland and riparian area below Duck Bridge.

Response

EPA shares the concern about the Milltown aquifer; however, EPA believes the process and pathway through which arsenic enters the aquifer, as described in the *Remedial Investigation*, will be changed through implementation of the remedy as described in this *Record of Decision*. Remedial activities will eliminate the reservoir (through dam removal), which created the head to drive the arsenic into the groundwater system. The elevation of local groundwater will drop to its pre-dam levels, which will influence whether the river contributes water to the groundwater or visa versa through the project area. The most contaminated source material (Area 1) will be removed, eliminating the contaminated pore water, and a new floodplain and channel will accommodate the freely flowing Clark Fork River. These significant changes will have a positive effect on aquifer water quality by hastening the degradation of the existing plume. EPA will carefully monitor this occurrence to document the results and make changes if necessary.

3.2.9.3 Contaminants in Surface Water

Summary of Comments

Several topics were discussed in this category and most commenters wanted additional studies conducted downstream of Milltown dam since historical flow events in the Clark Fork River have transported contaminated sediments hundreds of miles from their source. The primary concerns posed by commenters are as follows:

- The proposed remedy is perceived as removing the only safeguard in place (Milltown Reservoir) that prevents the transport of contaminated sediments further downstream. EPA has not studied the downstream risks and ramifications associated with this action.
- EPA has not considered the potential for recontamination of Milltown and all other downstream reservoirs as a result of contaminated sediment transport from the upper reaches of the Clark Fork River. BMPs and other control measures need to be used to prevent redeposition of contaminants and the creation of another Superfund site downstream.
- Increased contaminant loading during implementation of remedial construction is a concern and EPA's modeling, which is perceived as an underestimation of the amount of contamination that could be released, fails to reasonably assess the cumulative impact on human health and the environment.
- Concern was expressed about impacts to the integrity of the existing lined tunnel pond (sediment pond) by the remedial activities.
- Another concern was whether all seepage water from the excavated sediments would be sampled and treated or whether it would be directed back into the excavation where it might enter groundwater.
- The *Revised Proposed Plan* did not mention how sediment effluent concentrations may change in the river environment (geochemical reactions) and how dilution from tributaries might influence water quality. Such changes should be incorporated into the

determination of the downstream monitoring program including where to sample, frequency of sampling and the constituents sampled.

- EPA's construction water quality standards are presented in the *Revised Proposed Plan* in *Exhibit 5: Milltown Reservoir Sediments Site Proposed Temporary Construction Related Water Quality Standards*; however, no discussion is provided for how these numbers were generated.

Response

For clarity, the individual comments expressed above are separated into individual response paragraphs below.

EPA understands the concerns expressed by downstream interests relative to the removal of the Milltown Dam. EPA evaluated numerous alternatives before deciding on the merits of this remedy as is discussed in the *Record of Decision*. Embodied in that decision making process is careful consideration of a long term option that will protect human health and the environment, and will not relocate the problem to a site further downstream. EPA believes that the current plan—which incorporates engineering controls, BMPs, and dry excavation and specific timing of critical field activities (just prior to spring runoff)—appropriately mitigates risks to downstream interests.

As discussed in a comment on the *Original Proposed Plan* relative to upstream inputs (see Section 2.2.9.3, *Upstream Inputs*, of this *Responsiveness Summary*), implementation of the upper Clark Fork River OU remedy will require approximately 10 years to complete. The existing conditions in the upper Clark Fork do not resemble those of historic times when mine tailings and waste were discharged directly into the Clark Fork River, and other tributary streams. Years of floods and rainfall events have already scoured, transported, and deposited most of the available waste material downstream. EPA is not interested in sustaining the Milltown reservoir as an in-stream mine waste repository. EPA is obliged to implement a permanent remedy in a timely fashion to resolve human health and ecological risk concerns associated with the MRSOU. The remedy as proposed, accomplishes this task while meeting the required CERCLA criteria.

EPA has conducted careful studies on the impacts to surface water quality resulting from the remedial activities. These include surface water quality modeling by the USACE (P. Schroeder, 2001), computer modeling of groundwater completed by Dr. Chris Brick, Clark Fork Coalition (January 24, 2003), a report on *Impacts of Groundwater and Bank Storage Inflow on Water Quality in the Clark Fork River* (CH2M HILL 2003), and sediment scour modeling (Envirocon, May 2004). The results of these studies have illustrated to EPA that the remedy is well conceived and it will have no long term adverse effects on downstream interests.

The existing lined waste repository near the tunnel will be preserved without impact. The remedial design for the floodplain will isolate this area even more than it currently is from future flood events. The monitoring network around this repository will be retained and utilized in accordance with existing post-construction remedial monitoring requirements.

Seepage water from excavation of the sediments will be sampled and evaluated. The specifics of how best to handle it will be decided during remedial design and the initial stages of construction. If it would cause an exceedance of the temporary construction water quality standards or otherwise pose a threat to surface or groundwater quality, it will be treated before being discharged.

As discussed in previous responses to the *Original Proposed Plan*, EPA employed a number of studies to help answer questions about impacts to water quality. For example, in 2001, EPA worked with the USACE (Seattle District, P. Schroeder, 2001) to model potential surface water quality impacts that might occur, if sediment pore water and suspended sediment were released during the proposed removal of sediments (at that time, the removal method consisted of 15 percent excavation and 85 percent dredging). The results of the modeling illustrated that arsenic, cadmium, lead, and zinc concentrations are not predicted to exceed the Montana acute toxicity standards. Similarly, arsenic and zinc are not predicted to exceed the Montana chronic toxicity standards. Arsenic concentrations are also not predicted to exceed Montana WQB-7 Standard for the protection of Human Health during the dredging. As previously stated, the transition of the project into dry excavation of the sediments after the dams have been removed, as well as construction of a bypass channel for the Clark Fork River, further reduces the potential for water quality impacts. A comprehensive, detailed surface water monitoring plan will be prepared during the remedial design phase of the project. This plan will be thoroughly reviewed by EPA, DEQ, all Trustees, and other designated parties before its implementation.

An explanation of the water quality construction standards to be applied to this project is presented in Part 2, *Decision Summary*, of this *Record of Decision*, Section 12.4, *Control of Sediment Releases During Construction*. Their development and application were predicated on both EPA and State approval:

3.2.9.4 Air Quality

Summary of Comments

Comments in this category focused on contaminated sediment material becoming airborne dust, resulting in health hazards to the general public as well as an annoyance. On a larger scale, several comments expressed concern that airborne dust would affect the general public in Opportunity, Bonner, and surrounding communities.

Response

The *Human Health Risk Assessment* determined that inhalation of arsenic associated with airborne dust from the sediments, in and of itself, would not pose an unacceptable risk to human health. Regardless, dust will be controlled to reduce the nuisance factor during the implementation of the remedy through several measures. Such measures will include spraying water on dry sediments prior to and during excavation, covering or spraying water on stockpiled sediments, spraying water or dust palliatives (such as magnesium chloride) on unpaved haul roads, and covering of the sediments hauled in railroad cars. In addition, any sediments used in a capping medium at Opportunity Ponds will be re-vegetated, which will improve the current situation wherein blowing dust is an occasional problem for the residents in the vicinity of the ponds.

3.2.10 Ecological Risks

3.2.10.1 Wildlife Habitat

Summary of Comments

Comments in this category expressed the belief that wildlife populations would be adversely affected by the remediation described in the *Revised Proposed Plan*. They feel that dam and sediment removal will destroy the wetlands surrounding the reservoir, and adversely impact bald eagles, waterfowl, migrating birds, amphibians, deer, moose, and other species. Some asked if the wetlands could be preserved or restored following remediation.

Response

This response is identical to that provided for similar comments made on the *Original Proposed Plan* (see Section 2.2.9.1, *Ecological Risks*, of this *Responsiveness Summary*). EPA agrees that the remedial action, as described in this *Record of Decision*, will result in a dramatic change to the wetlands of the reservoir. Trustees such as the USFWS, FWP, and USACE have been working with and advising EPA on the remedial action and associated mitigation for the wetlands. Two extensive Biological Assessments, one for bull trout (CH2M HILL 2004a), and a second one for the terrestrial threatened and endangered species (including such species as bald eagles, grizzly bears), have been prepared (CH2M HILL 2004b). These documents outline in detail the anticipated impacts and proposed mitigation for aquatic and terrestrial species of concern. For instance, the assessment for the bull trout concluded that short term challenges would involve interim passage for bull trout during site remediation activities and the suspended sediment load created by the construction activities. However, upon completion, the remedy is expected to have a long term beneficial effect on bull trout. In the case of the bald eagle, it was determined that there would be some short term adverse impact because of the displacement of eagles from their foraging and historic nesting sites. However, this would have no overall effect on the bald eagle populations along the Clark Fork River corridor or in western Montana. No long term adverse impacts were identified.

3.2.10.2 Aquatic Health

Summary of Comments

Several topics were discussed by commenters in this category, including water quality, risks to fish populations, and bull trout passage. Some commenters in this category argued that water quality is not impacting fish now, and that implementing the remedy could make water quality worse and affect fish. While other discussion supported dam removal on the basis of restoring connectivity for bull trout populations, a few argued that bull trout flourish above the dam and the connectivity is not important or desired.

Response

This response is identical to that provided for similar comments made on the *Original Proposed Plan* (see Section 2.2.9.2, *Aquatic Health*, of this *Responsiveness Summary*). Responses to concerns about implementation of the remedy and its effects on water quality have been addressed in previous comment responses within this section. EPA believes that the remedy will result in attainment of Montana WQB-7 standards with the exception of copper exceedances caused by upstream releases. Removal of the primary source of contamination, removal of the Milltown Dam, and design and construction of a new channel will eliminate the potential for a catastrophic natural disaster should the Milltown Dam fail. It also reduces the potential for ice scour events that generate and transport contaminated sediment downstream, events which do adversely impact fish and other aquatic life. The remedy will create a free flowing passage for a variety of fish species, including bull trout, to migrate directly into the Blackfoot River drainage and the upper Clark Fork River.

3.2.11 Opinion of EPA

3.2.11.1 No Mailing List

Summary of Comments

People who requested that they not be added to the mailing list were not added.

Response

The names of these people were not added to the mailing list.

3.11.2 Public Outreach Effectiveness

Summary of Comments

One comment supported the *Revised Proposed Plan* because the plan resulted in public involvement and community acceptance.

Response

EPA agrees. The comments received from the public demonstrate a good knowledge of the *Revised Proposed Plan* and illustrate strong community support for the remedy. Ninety-seven percent of commenters fully support (or support with minor modifications) the *Revised Proposed Plan*.

3.2.12 Economic Impacts

3.2.12.1 Property Values

Summary of Comments

Comments in this category focused on the economic impacts of remediation and construction activities on the valley. Most of the commenters requested that wetlands impacted as a result of remediation activities be replaced so that homeowners do not lose irrigation and may enjoy wildlife aesthetics. Some people are also concerned that the lowering of the Blackfoot River may affect property values, expose steep banks, result in the loss of access to the river, and create increased personal liabilities. In addition, a few people are also concerned that there is no mention of remediation and restoration activities for residential properties upstream of Interstate 90 bridge on the Blackfoot River arm of the project area. Specific recommendations to the *Revised Proposed Plan* include the following:

- Extending the restoration project boundary to include the arm of the Blackfoot River, including adjacent residential properties.
- Developing a mitigation plan that address the loss of water elevation and any other impacts to homeowners on the Blackfoot River arm and would will effectively restore the quality of life for affected property owners.

Response

The Clean Water Act requires mitigation for impacts to wetlands, resulting in no net loss of wetlands. A mitigation plan will be developed, in consultation with the USFWS and USACE, to provide mitigation for the wetlands that will be lost and/or modified by implementation of the remedy. The implementation of the Restoration Plan will provide significant improvements to the riverine conditions at the site. EPA has been working with Milltown Redevelopment Group, a redevelopment group comprised of area residents, to explore future land use and development opportunities.

3.2.12.2 Payment for Cleanup

Summary of Comments

Several topics were discussed in this category, including agreement within the *Revised Proposed Plan* that an effective remedy was chosen correctly in terms of cost, that the RPs be held responsible for their share of the costs, and a rhetorical comment that every town and taxpayer contributing garbage to the Clark Fork River also be held accountable for some of the cleanup cost burden.

Response

EPA concurs that the remedy described in the *Revised Proposed Plan* is a cost-effective remedy. The RPs will be responsible for the cost of the cleanup, either by implementing the remedy themselves, or by paying for the costs if EPA undertakes implementation of the remedy. Appropriate responsible parties for the site have been identified by EPA, in accordance with CERCLA. EPA has conducted a careful search for potentially responsible parties, and Atlantic Richfield Company, a subsidiary of British Petroleum, and the NorthWestern Corporation were the only RPs identified as being responsible for the contamination at the Milltown site.

3.2.12.3 Community Economic Changes

Summary of Comments

Many commenters stated that the plan was a good investment in the area and expected the remediation to positively impact area jobs (hopes that local union labor would benefit), recreation, and businesses. Some people feel that the economic impacts to local residents have not been adequately addressed. Others would like support to attract development to the area. Comments from Opportunity request assistance through funding to aid the town with some infrastructure or utility projects to offset the waste dumping and "Superfund site stigma" perception that has historically slowed growth in the area. Some people also would like additional funding for redevelopment planning efforts to hire local and professional services, and continued support for the Milltown Working Group.

Response

Under the Superfund program, EPA can provide grants to local entities for technical assistance associated with the cleanup program. These types of grants typically provide funding such that local communities or concerned stakeholder organizations can obtain independent professional advice and assistance concerning the technical aspects of the cleanup. This type of grant has been awarded to the Clark Fork River Technical Assistance Committee for this site. Similar grants were awarded to the Arrowhead Foundation for the Anaconda Site. EPA has been working with a local redevelopment group, the Milltown

Redevelopment Group, and has provided funding in support of this group. EPA will continue to work with and support the Milltown Redevelopment Group as the site moves through remediation and restoration and into redevelopment. EPA acknowledges Opportunity residents' desire for funding; however, it should be noted that cleanup activity in the area has already resulted in millions of dollars added to the area economy, numerous jobs associated with the cleanup, and an improved environment.

3.2.12.4 Water Rights

Summary of Comments

These comments asked EPA to follow the appropriate process for applying for water rights that might be needed as part of the remedy. Water rights are integral to any consumptive or non-consumptive use of water and appropriations are strictly regulated. The commenter stressed that regulatory and resource agencies should work together to comply with the needs of the project in a timely manner. The use of water for dust abatement is an example where a water right may be required to accommodate that consumptive use.

Response

EPA, in consultation with the State, will work with the various regulatory and resource agencies should these issues arise.

3.2.13 Comment Noted—No Response Required

EPA read many comments that were general opinions or historical data and did not comment directly on a specific component of the *Revised Proposed Plan*. Some of the other comments included results of aquifer modeling, historical anecdotes that enhance EPA's understanding of the project area, and copies of articles and presentations concerning the MRSOU. These opinions and information benefited EPA's staff and assisted with development of the *Revised Proposed Plan*. However, a direct response was not possible.

Response

No specific response is required.

3.2.14 Compliance with Regulations

3.2.14.1 Other Federal Regulations

Summary of Comments

A comment in this category stated that changes to the current Federal Emergency Management Agency (FEMA) regulatory floodplain maps and flood insurance studies will need to be approved through an application for Conditional Letters of Map Revision by FEMA prior to construction as well as final Letters of Map Revision issued upon project completion.

Response

EPA acknowledges that the removal of Milltown Dam and Stimson Dam will change the characteristics of the floodplains regulated under FEMA. The FEMA and floodplain requirements are an ARAR that is addressed in Attachment A to this *Record of Decision*. EPA will consult with the FEMA authorities to assure that the substantive requirements of FEMA are addressed prior to and upon completion of the remedial actions.

3.2.14.2 Fully Considered Impacts

Summary of Comments

The commenters in this category focused on whether EPA fulfilled all of its obligations for remedy analysis under CERCLA. Some were concerned that the *Revised Proposed Plan* was deficient in both public accountability and assurances. Others were concerned that the *Revised Proposed Plan* did not address the potential for a catastrophic event and requested that an analysis be performed to evaluate BMPs and control measures to minimize the deposition of contaminated sediments downstream. A few were also concerned that the *Revised Proposed Plan* failed under CERCLA because the remediation would significantly increase arsenic, copper, and total suspended sediment (TSS) loading to the Clark Fork River.

In addition, a recommendation was proposed to prepare a "comprehensive groundwater and surface water source, transport, and fate assessment that evaluates both the short and long-term potential for risk from contamination from a post-remediation standpoint from the Opportunity Ponds and other sources in the Upper Clark Fork River Basin."

Response

EPA believes it has fulfilled all of its obligations for remedy analysis under the NCP and conducted a thorough analysis of issues regarding the Milltown cleanup. This *Record of Decision* contains a more thorough discussion of potential water quality impacts and conceptual design elements for the capacity of the bypass and new channel to handle flood flows. However, it is not uncommon for details of design strategies to be delayed until the onset of remedial design. EPA has provided as much information as possible, as it discusses the remedy in this *Record of Decision*.

Downstream impacts associated with uncontrolled releases of sediments were modeled by the USACE to evaluate potential metals loading and by using HEC 6 to assess mobilization and transport of scoured sediment downstream. This activity resulted in the decision to construct a bypass channel through Area 1 (see Part 2, *Decision Summary*, Section 12) and to pursue certain construction activities on a schedule that coincided with spring runoff.

Surface and groundwater monitoring during construction and post construction will provide EPA with adequate information to determine the effectiveness of its remedies on the Upper Clark Fork and at Milltown.

3.2.14.3 RAOs and RAGs

Summary of Comments

One commenter felt that the RAOs and RAGs were incomplete because they do not adequately address the quality of life performance standards for local residents through the duration of the project in the form of monitoring, complaint evaluation, mitigation and contingencies, and reporting and notification. Another commenter recommended that development of technical performance standards provide detailed "course of action" solutions to eliminate the "may be," the "potential for," and "could have" clauses in the *Revised Proposed Plan.*

Response

The RAOs were developed to protect human health and the environment relative to the threat of principle wastes in accordance with EPA guidance. The remedy as described in this *Record of Decision* accomplishes that objective. EPA has taken a number of steps to minimize the impact on the local community (traffic, noise, dust, etc.) during construction, steps which BPA believes will help maintain quality of life in the Milltown area. However, if issues arise which cause concern, the public is encouraged to contact EPA at (406) 457-5040. With regards to the second comment, performance standards are set forth in this *Record of Decision*. It is anticipated that refinements to the methods for meeting these standards will be crafted as part of the remedial design phase of the project, before implementation.

3.2.15 Social Impacts

3.2.15.1 Reservoir Recreation

Summary of Comments

Commenters in this category were concerned about the loss of flatwater recreation in the area, and asked that a whitewater park be included in the final restoration.

Response

As stated in a response to a similar comment made on the *Original Proposed Plan* (see Section 2.2.16.1, *Reservoir Recreation*, of this *Responsiveness Summary*), the *Record of Decision* requires the removal of Milltown Dam and 2.6 million cubic yards of sediment in an action designed to help protect human health and the environment. This is EPA's primary goal. Removal of the dam eliminates the reservoir and the flatwater resource associated with it. In its place, the Clark Fork and Blackfoot rivers are restored to a free flowing state, allowing fish passage (including bull trout) and re-instating the natural confluence of the rivers. The natural resource damage Trustees developed the restoration goals associated with this *Record of Decision*. Construction of a whitewater park is beyond EPA's authority under Superfund law; however, the idea has been proposed by Missoula County. Current restoration plans will provide some whitewater due to the gradient of the rivers at the confluence.

3.2.15.2 Noise, Traffic, Dust, and Odors

Summary of Comments

Most people who commented in this category are concerned about the quality of life in Milltown and Bonner during remediation. The increased traffic poses a safety risk, and the noise from haul trucks, trains, and equipment will impact the residents and the educational environment at Bonner School. Airborne dust could pose a health threat, or at least an annoyance during remediation, especially on the exposed river bank. A few people indicated that odor control will also be an issue once the Milltown reservoir is lowered, exposing organic material found in the river sediment.

Response

Noise, traffic, and dust will be mitigated by the location of the rail spur and train loading dock at Area 1, as described in this *Record of Decision*. Most of the comments expressed under this category are addressed in Part 2, *Decision Summary*, Section 12. Equipment will operate and be staged south of Interstate 90. Trains will be operated late at night to avoid adding to local traffic congestion and disturbing residents and the educational environment of Bonner School. The human health risk assessment and the ATSDR health consultation in 2003 determined that inhalation of arsenic associated with airborne dust from the sediments would not pose an unacceptable risk to human health. Regardless, dust will be controlled to reduce the nuisance factor during the implementation of the remedy through several measures. These will include spraying water on dry sediments prior to and during excavation, covering or spraying water on stockpiled sediments, spraying water or dust palliatives (such as magnesium chloride) on unpaved haul roads, and covering of the sediments hauled in railroad cars.

EPA is aware of concerns about possible odors and has consulted with the USACE. In the USACE's experience, odor is generally not a problem for this type of project.

3.2.15.3 Controlled Public Access

Summary of Comments

Most of the comments in this category focused on the need (from a safety standpoint) to establish some type of viewing or spectator area during the different phases of construction and remediation activities. A few people commented on public safety, such as providing fencing in select locations. One commenter was concerned about recreational use in the area during remediation efforts. Another commenter suggested installing a web cam to view the remediation and restoration activities during implementation.

Response

Temporary construction fencing will be installed at selected locations during the course of the remedial activities where access to construction areas could pose a safety risk to the public. EPA will sponsor site tours and open houses at selected junctures during the project to provide information and guided tours/presentations so that a safe forum for public viewing of construction activities is provided. EPA is also looking at possible safe locations to establish a public viewing area during construction. EPA will work with the RPs and their contractors to try to minimize impacts to recreationists as much as feasible. However, to protect public safety, recreational use of the area will unfortunately need to be curtailed at critical times and locations during portions of the remedial actions. EPA will suggest the concept of web cam(s) to the RPs as a method of keeping the public informed about project progress in a safe manner.

3.2.15.4 Historical Documentation

Summary of Comments

Most of the comments in this category recommended that some type of interpretive center near Milltown reservoir be established to preserve and document the historic events surrounding the Milltown Dam. One commenter requested that a historian or web cam be considered to document historic events associated with dam removal and record the remediation and restoration efforts. Another agency recommended initiating the Section 106 (historic preservation) process so that timely consultation, discussion, and planning may proceed. In most instances, commenters stated that funding should be made available as part of the remediation and restoration process to accommodate the historic nature of the project.

Response
The NHPA is an ARAR that is addressed in Attachment A to this *Record of Decision*. The requirements for documenting the historic features of Milltown Dam and its powerhouse are covered under Section 106 of the NHPA. EPA and the Federal Energy Regulatory Commission (FERC) will comply with the requirements of Section 106, which specifies that a plan for documentation of the historic aspects of the site be developed, in consultation with the Montana State Historic Preservation Officer (SHPO), prior to removal of Milltown Dam and the powerhouse. The documentation will be conducted by qualified professional historians or archeologists, and the documentation will be available to the public. The Milltown Redevelopment Group is researching the possibility of an interpretive center located near the site to describe the history of the area and the dam.

3.2.16 Cooperation Among Agencies

3.2.16.1 Favors Integration with Other Agency Plans

Summary of Comments
The overwhelming majority of comments in this category emphasized coordinating the remediation plan with the restoration plan and collaborating between local working groups, government agencies, and property owners. One commenter suggested reviewing the FERC process, under the functional equivalency doctrine, to consider whether or not a separate EIS is really required instead of using the existing RI/FS and other documentation. A couple of comments also stated that FERC should expedite license surrender for Milltown dam to allow the EPA implementation schedule to be met.

Response
EPA has been coordinating with the State throughout this entire project. The CERCLA process includes criteria for State acceptance of the remedy and this criteria is important to EPA at this site. In addition, CERCLA requires coordination between EPA and the natural resource damage Trustees. The remedial design will include both remedial and restoration activities and all Trustees will review the final plans prior to implementation. Because the surrender of a hydropower operating license is at stake, FERC will continue to assist all government parties with the FERC license surrender process associated with this project.

3.2.17 Third Party Interests

3.2.17.1 Upstream Impact Concerns

Summary of Comments
A comment expressed concern for the residents of Opportunity in that there has not been sufficient information regarding quality of life, water quality, air quality, and general health and safety concerns for the placement of contaminated sediments in the Opportunity Repository.

Response
The Opportunity Ponds is an active waste repository managed by Atlantic Richfield Company on its property under EPA and State oversight. Activities associated with disposal of the Milltown sediments will be monitored as part of the Anaconda Regional Water and

Waste OU. EPA does not anticipate creating adverse impacts to the town of Opportunity by depositing these wastes at Opportunity Ponds.

3.2.17.2 Downstream Impact Concerns

Summary of Comments

Several topics were discussed in this category, including a sampling analysis of the Thompson Falls Dam sediment, liability to downstream stakeholders, and accountability throughout the relicensing process. One commenter asked for a sampling analysis of the Thompson Falls Dam sediment to establish a baseline for future effects of the sediment. Others suggested improving the *Revised Proposed Plan* to limit liability to downstream stakeholders. Another requested that EPA and Atlantic Richfield Company provide assurances that measures will be in place to limit impacts to downstream resources and FERC-licensed projects, and that FERC provide assurances that downstream hydroelectric licensees will not be held accountable for impacts associated with the cleanup.

Response

The *Record of Decision* identifies a significant program to reduce the risk of downstream impacts associated with the project. These include construction of the bypass channel, use of sheet pile to isolate sediments, employment of sediment control BMPs (for example, silt curtains, coffer dams, flood control berms, and regrading of stream banks), construction of grade control structures in the new river channels, and extensive re-vegetation of the re-constructed river channel, and careful scheduling of reservoir drawdown and dam removal. Downstream irrigation intakes will be monitored during implementation of the remedy, and will be cleaned out if sediments are deposited that could impact the delivery of irrigation water. A comprehensive monitoring plan will assess the downstream physical, chemical, and biological impacts. If necessary, adjustments or additional BMPs will be employed to minimize the downstream impacts. In summary, EPA will make every effort to minimize downstream impacts.

4 RP Comments and EPA Responses

4.1 Introduction

The Atlantic Richfield Company and NorthWestern Corporation, the RPs for the MRSOU, submitted comments on the *Original Proposed Plan*. Neither party provided comments on the *Revised Proposed Plan*. Section 4.2 contains responses to the comments provided by NorthWestern Corporation. Sections 4.3 and 4.4 contain responses to the comments provided by the Atlantic Richfield Company.

4.2 NorthWestern Corporation

NorthWestern Corporation submitted a two-page comment letter, dated July 21, 2003. Their comments, along with EPA's responses, are provided below.

1) NorthWestern Corporation's Role in the Remedy

Summary of Comments

NorthWestern Corporation owns the Milltown Dam and holds the valid FERC license through 2007. NorthWestern Corporation does not believe it has any significant liability under Federal or State law for the contamination at the Milltown Dam and reservoir, because of the provisions expressly exempting the owner/operator of the Milltown Dam from such liability found in Section 118(g) of CERCLA. However, NorthWestern Corporation has been working cooperatively with all affected parties and the concurrence of NorthWestern Corporation is an essential ingredient of any final remediation of the MRSOU.

Response

EPA acknowledges the concurrence of NorthWestern Corporation with the Selected Remedy, and the formal actions by NorthWestern Corporation since the comment letter was written towards surrender of the FERC license.

2) Support for the Remedy

Summary of Comments

If the FERC license is formally relinquished, which is contingent on agreement to a satisfactory settlement of various liability issues in the form of a consent decree, then NorthWestern Corporation would support the *Proposed Plan*.

Response

EPA acknowledges NorthWestern Corporation's conditional support. EPA, NorthWestern Corporation, and other parties are in discussions regarding NorthWestern Corporation's alleged liability and the settlement of CERCLA and other claims against NorthWestern Corporation and other parties.

4.3 Atlantic Richfield Company: General Comments

The letter from the Atlantic Richfield Company, dated July 21, 2003, contained three sections. The first two sections contained general comments, primarily consisting of legal and policy issues, concerning the selection of the Preferred Remedy. The third section contained point-by-point comments on the *Original Proposed Plan*. This section addresses the general comments. The comments specific to the *Original Proposed Plan* are addressed in Section 4.4.

4.3.1 Section I: General Comments on the MRSOU Cleanup Proposal

1) Comment A

Summary of Comments

Comment A discusses the administrative uncertainties associated with decommissioning a FERC-licensed hydropower project and removal of a dam owned by a third party. The Atlantic Richfield Company maintains that EPA does not have authority under CERCLA to remove Milltown Dam without permission from the licensee, and asserts that such action would constitute a takings of private property requiring payment of just compensation. Recovery of such costs cannot be part of response costs. FERC has exclusive authority over licensing, decommissioning, and removal of hydropower projects, and the Atlantic Richfield Company alleges that EPA is overstepping its bounds in determining that the dam must be removed.

Response

As noted above, EPA is working cooperatively with the dam owner, NorthWestern Corporation, concerning the voluntary surrender of the Milltown dam license by NorthWestern Corporation. EPA is also working with the FERC to ensure that the CERCLA remedy is implemented in a manner that is consistent with FERC's authorities over Federally licensed dams, in accordance with CERCLA law. EPA disagrees that remediating a harmful environmental situation is a takings of property, and, in any case, any such issue can be addressed through other compensation processes if it is deemed a takings. Finally, the issues raised by Atlantic Richfield Company in this comment are actually issues of concern to NorthWestern Corporation, and not Atlantic Richfield Company, and Atlantic Richfield Company lacks standing to raise them in a formal, legal sense.

2) Comment B

Summary of Comments

Comment B summarizes the results of previous ecological and human health risk evaluations that demonstrate actual risks are being overstated and mischaracterized to support selection of a dam and sediment removal alternative. The Atlantic Richfield Company cited findings from several studies that indicate that there is a lack of observable ecological risks at the site. Human health risks at the site, in the Atlantic Richfield Company's opinion, were limited to an exposure pathway that was already addressed through constructing a replacement water supply for the community of Milltown.

Response

EPA believes the risks to the environment are carefully weighed and evaluated in its Baseline Ecological Risk Assessment (1993b) and the Ecological Risk Assessment Addendum (April 2000). Atlantic Richfield Company was given opportunity for input into those processes, and all of Atlantic Richfield Company's comments were carefully considered. EPA's ecological risk assessments found that there is unacceptable risk caused by releases of hazardous substances under certain conditions at the Milltown Dam. The 1996 ice scour event was an episodic occurrence of such a situation. Water quality data collected by the USGS and others after that event documented the corresponding increase in suspended sediment load and associated total and dissolved metals and arsenic concentrations that occurred during the event. After the 1996 ice scour event, fish populations downstream of the dam decreased significantly. According to Montana FWP, total catchable trout (greater than 8 inches) decreased from 425 to 162 per mile, while the declines of juvenile brown and rainbow trout (less than 8 inches) were 70 and 85 percent, respectively. EPA's more detailed response to the Atlantic Richfield Company concerns about ecological risk found by EPA are addressed in the text of the Ecological Risk Assessment and its Addendum, which is incorporated herein by reference. Finally, Atlantic Richfield Company does not contest the serious ecological risk that would occur if the Milltown Dam were to fail. The Milltown Dam was re-classified by FERC as a high hazard dam. FERC regulations would require significant structural improvements to the dam by NorthWestern Corporation, the dam owner, if the dam were left in place and used to permanently contain the contaminated sediments behind it. NorthWestern Corporation has not shown any desire to implement such improvements because the Milltown Dam is no longer a profitable energy producer for the company. Thus, there remains the substantial risk from dam failure and the release of the contaminated sediments in the reservoir if the Selected Remedy is not implemented.

As to human health risks, EPA's risk assessment protocols require the examination of possible risk, as well as actual risk. For the Milltown area aquifer, it is without controversy that drinking water from the contaminated portions of that aquifer would cause unacceptable risk in the form of increased cancer and non-cancer risk—see EPA's Human Health Risk Assessment (Baseline Human Health Risk Assessment, Milltown Reservoir Operable Unit, MRSOU, 1993a). Atlantic Richfield Company contends that the existing replacement water supply prevents the risk of any exposure to the aquifer. However, there are not permanent and enforceable institutional controls in place at the site to prevent a homeowner from drilling a new well or using an existing well, if that homeowner chooses to opt out of the alternative water supply system. The State of Montana classifies the aquifer as usable for drinking water, and has expressed its view that the aquifer must be cleaned, if feasible, to make it usable again as a drinking water source. Accordingly, the unacceptable risk to human health is well founded for this site, and an appropriate basis for the selection and implementation of the Selected Remedy.

3) Comment C

Summary of Comments

Comment C describes the dam modification plus institutional controls remedy (Alternative 2A of the *Final Combined Feasibility Study* [CFS], Atlantic Richfield 2001) supported by the Atlantic Richfield Company and explains how it is protective, attains

ARARs or justifies an ARARs waiver, is fully consistent with the National Contingency Plan (NCP), and meets CERCLA's cost-effectiveness mandate. Alternative 2A would have provided for enhanced fish passage around the dam, dam safety upgrades as needed to withstand the probable maximum flow, replacement of the spillway and flashboard system with a pneumatic crest (inflatable rubber dam) to control peak flow and ice events, and implementation of institutional controls and continued operation and maintenance funding for Milltown's replacement water supply. Atlantic Richfield Company feels that Alternative 2A provides long-term effectiveness and permanence and reduces contaminant toxicity, mobility, and volume through physical containment and natural attenuation over time. Finally, the Atlantic Richfield Company stated that this is the most cost-effective remedy for the MRSOU, and responds best to the concerns of the local communities most affected by dam removal (Milltown and Bonner).

Response

Atlantic Richfield Company's preferred remedy does not meet the criteria for selection of a remedy found in CERCLA and the NCP regulations. ARAR compliance, including groundwater ARAR compliance, is necessary and required at a Superfund Site, unless a waiver is justified. EPA examined Atlantic Richfield Company's proposals and its petition for a waiver of groundwater standards, and found that, under these site-specific circumstances, it is feasible to clean up the aquifer and that a waiver of groundwater standards would not be appropriate under the law. The Feasibility Study also demonstrated that the Atlantic Richfield Company's preferred remedy did not meet the long term effectiveness and permanence balancing criteria, because it required perpetual operation and significant maintenance of the aging Milltown Dam—something the owner of the dam indicated they would prefer not to do. The ICs necessary for Atlantic Richfield Company's preferred remedy are opposed by Missoula County and may not be implementable. Finally, Atlantic Richfield Company's preferred remedy did not receive support from the community or the State, two important modifying criteria under the NCP. All of this led EPA to determine that Atlantic Richfield Company's preferred remedy did not meet threshold criteria, or provide an appropriate balance and tradeoff among the balancing and modifying criteria of the NCP, and thus could not be selected.

4) Comment D

Summary of Comments

Comment D provides a general critique applicable to all the dam and sediment removal alternatives including the alternative presented as the Proposed Action in the MRSOU Cleanup Proposal. As part of the critique, Atlantic Richfield Company shows how higher costs of dam and sediment removal alternatives and their additional short-term impacts are not offset by improvements in protectiveness, risk reduction, or compliance with surface water quality ARARs relative to Alternative 2A. Atlantic Richfield company also cited concerns that wetland impacts are greater than stated by EPA; specifically stating that replacing 130 acres of productive onsite wetlands is not a good approach. Finally, issues related to bull trout predation by Northern pike are unrelated to the fate and transport of metals through the MRSOU and are not a factor that can be legally considered in the remedy decision.

Response

EPA acknowledges that there are short term impacts—wetlands destruction and water quality contaminant increases during removal of sediments—are present with the Selected Remedy. However, EPA believes that with careful planning and engineering, the water quality contaminant increases can be managed to stay within or near acceptable levels such that long term risk does not occur to aquatic or downstream receptors. EPA also believes that riparian wetlands that will be created at the site during implementation of the Selected Remedy and the State of Montana Restoration Plan will be valuable and important to the riparian habitat and the area. The ARARs for the Selected Remedy require that there be no net loss of wetlands as a result of the implementation of the Selected Remedy, and EPA intends to ensure that this happens. Finally, if EPA selected a remedy that left the dam in place, that Federal action is required to be reviewed under the Endangered Species Act (ESA) according to Federal law. EPA's initial consultation with the US Fish and Wildlife Service, and the resulting Biological Assessment and Biological Opinion, examined the alternatives and their effects appropriately—and this includes the effects of continued pike fishery populations towards the protected bull trout. In short, EPA has considered the issues raised in this comment in detail, and concluded that the Selected Remedy's short term impacts are manageable and do not outweigh the significant long term benefits from the Selected Remedy, and that the Selected Remedy is in compliance with the ESA.

5) Comment E

Summary of Comments

Based on Comments A through D, Atlantic Richfield company concludes that a dam/sediment removal action may not be lawfully selected for the MRSOU. However, Comment E identifies design criteria and construction flexibility that must be considered, should EPA ultimately select a dam/sediment removal alternative, as follows:

1. Removal and offsite disposal should be limited to sediments that potentially represent a significant loading source to the downstream surface water or to the alluvial aquifer groundwater.
2. Active treatment of pore water released during removal and handling of sediments is cost prohibitive and impracticable given anticipated flow rates.
3. Impacts to downstream water quality and aquatic life during construction are unavoidable if sediment/dam removal alternative is selected.
4. EPA's proposed river channel and floodplain reconstruction/revegetation must be limited to meeting remedial action objectives only, and not include natural resource restoration.
5. Additional interim fish passage measures are unnecessary and not cost-effective. Further, this is FERC's responsibility, and not the EPA's or Atlantic Richfield Company's.
6. Replacement revenues to government is unauthorized under CERCLA and the NCP. Any revenues lost because the Milltown Project is eliminated are not related to protection of human health and the environment.

Response

EPA's Selected Remedy does indeed focus on the most contaminated and mobile of the sediments, and requires the removal of only those sediments. Active treatment of pore water is not currently required under the Selected Remedy, but may be required if temporary water quality standards are violated during remedy implementation. EPA's remedial channel design and reconstruction with vegetation meet EPA remediation standards – EPA has worked closely with natural resource damage Trustees to provide for the construction of a more natural and fish friendly channel as part of the project, using a combination of Superfund remedial and restoration authorities. Interim fish passage measures have been addressed by EPA and FERC in the comprehensive Biological Assessment and Biological Opinion for this project, and are likely to be implemented by the dam owner, NorthWestern Corporation. Lost government revenues are not addressed in the Selected Remedy.

4.3.2 Section II: Alternative Dam and Sediment Removal Approach Description

The recommended design and construction flexibility discussed above in Atlantic Richfield Company's Comment E is incorporated into an alternate approach to sediment and dam removal that is presented in detail in Section II of their comments.

1) Comment A

Summary of Comments

In this comment, the Atlantic Richfield Company describes a dry sediment removal alternative, including dewatering Area 1 sediments by lowering the reservoir water levels, isolating the Area 1 sediments from flowing surface water with sheet piles, removing the spillway and radial gate section of the Milltown Dam, preloading Area 1 sediments with backfill material, removing up to 2.6 mcy of sediment in Area 1 through mechanical excavation, loading the sediment into train cars for transport to Opportunity Ponds, reconstructing the Clark Fork and Blackfoot River channels and regrading the floodplain to provide stability, and acknowledging the existence of the replacement water supply program.

The dry removal conceptual approach has several advantages, according to the Atlantic Richfield Company. Some of these advantages include enhancing sediment dewatering efficiency prior to removal, providing for early fish passage, providing cost savings to the dam owner for a reduced period of maintenance, mitigating risks of dam failure during construction, potentially reducing the timeframe for achieving improved groundwater quality, and shortening the overall duration of the project.

Response

Subsequent to the writing of this comment letter, Atlantic Richfield Company and its contractor, Envirocon, submitted to EPA a modification to alternative 7A2. The modification proposed a dry removal process that would allow, as described above, the mechanical excavation of the sediments and their loading into rail cars for transport to the Opportunity Ponds for disposal. EPA evaluated the technical aspects of the proposal, and requested additional information relevant to potential scouring of sediment by the rivers when the pool level of the reservoir is dropped. After review of the sediment scour modeling by Atlantic Richfield Company, EPA requested that a bypass channel be incorporated into the dry removal proposal to further reduce the risk of transporting contaminated sediment downstream. EPA has been receptive to Atlantic Richfield Company's construction modification suggestions. A refined remedial process, which incorporates this approach, was the subject of a *Revised Proposed Plan* (EPA, May 2004) and is presented as part of the Selected Remedy in Section 12 of this *Record of Decision*.

2) Comment B

Summary of Comments

FERC should adopt EPA environmental review as a functional equivalent of its own environmental review and use EPA's analyses in its decision making process. The Atlantic Richfield Company feels that no duplicative Biological Assessments, or Environmental Assessments/Environmental Impact Statements, would be necessary to support an application to decommission the Milltown Project and remove the dam. While the functional equivalent doctrine is typically applied to relieve EPA of NEPA requirements, the doctrine applies here to relieve FERC of any requirement for preparing a separate but redundant environmental review of the same actions that have been analyzed in the comprehensive CERCLA decision process.

Response

EPA is working cooperatively with FERC concerning FERC's consideration of the Milltown response and restoration project, including FERC's use of EPA studies and analysis under the NEPA law. FERC is ultimately responsible for compliance with this law in the context of FERC license surrender proceedings, and will make appropriate determinations. EPA has also worked cooperatively with the USFWS and FERC to produce a comprehensive Biological Assessment and Biological Opinion for the comprehensive cleanup, in an effort to avoid duplication or inefficient analysis.

4.4 Atlantic Richfield Company: Specific Comments on the *Original Proposed Plan*

The text of each issue number refers to the page and section of the April 2003 *Proposed Plan* that Atlantic Richfield Company targets in their comments.

1) Proposed Plan, page 10, last paragraph of "Surface Water Transport of Contaminants"

Summary of Comments

In the *Proposed Plan* it is stated that, "If the dam were ever to fail, catastrophic environmental effects would occur from the release of contaminated sediments into the Clark Fork River." Atlantic Richfield Company believes this statement is contrary to, and overstates, the findings of the Continued Release Risk Assessment (1994) relative to the environmental risks associated with such an occurrence.

Response

EPA stands by its assertion that if the Milltown Dam were to catastrophically fail, significant impacts to the downstream aquatic environment would occur. This opinion is based, in part, on the results of the 1996 ice scour event where significant volumes of reservoir sediment were mechanically scoured, entrained in the water column, and transported downstream.

Water quality data collected by the USGS and others documented the corresponding increase in suspended sediment load and associated total and dissolved metals and arsenic concentrations that occurred during the event. The ice scour event entrained far less sediment than would a failure of the dam, and illustrates on a much smaller scale the potential for environmental impacts should such a release occur. The continued Release Risk Assessment (1994) also supports in a qualitative fashion, the obvious unacceptable risks that would occur from dam failure and the release of the 6 to 7 million cubic yards of contaminated material which resides behind Milltown Dam.

2) Proposed Plan, page 11, first paragraph of "Wetlands"

Summary of Comments

Atlantic Richfield Company objects to the statement that, "the existing wetlands were formed by deposition behind a man-made dam; the new replacement wetlands associated with a free flowing river will be of **higher quality**." This statement appears to conclude that riverine wetlands are of higher quality than those formed in the reservoir. Furthermore, there is no lawful basis upon which the United States may seek mitigation/replacement of dam-related wetlands that are eliminated by EPA's selection of a remedial alternative.

Response

Section 12.10 of this *Record of Decision* (Part 2, *Decision Summary*) describes the expected outcomes of the remedy. Wetlands lost by removing the Milltown Reservoir will be replaced according to valuation methods developed by USFWS. EPA believes that valuable riparian wetlands will be created by the implementation of the State's Restoration Plan at the site. If these wetlands do not equal the functional value of the destroyed wetlands, EPA will require that additional wetlands will be developed within the Clark Fork Basin.

3) Proposed Plan, page 11, second paragraph of "Fisheries and macroinvertebrates"

Summary of Comments

The *Proposed Plan* makes a statement about slightly impaired biointegrity of the macroinvertebrate population below Milltown Dam except for the years 2000 and 2001. Atlantic Richfield Company believes this statement infers that the impairment is due to metals and should be more complete by stating that impairment can result from contaminants such as nutrients and organics which are a pervasive problem that is unrelated to mining within the Clark Fork Basin.

Response

EPA agrees that macroinvertebrate populations are influenced by numerous waterborne contaminants including nutrients, organics and metals. Below Milltown Dam, biointegrity was slightly impaired in 2003, although not corroborated with organic or metals sensitive metrics. The population metrics used, indicate no metals pollution had been observed since 1990, although nutrient-organic pollution has been evident (Part 2, *Decision Summary*, Section 5.6.2).

4) Proposed Plan, page 13, first paragraph of "Human Health Risks"

Summary of Comments

Contrary to the statement in the *Proposed Plan*, Atlantic Richfield Company believes that the configuration of the groundwater arsenic plume is stable and has not changed "significantly," as indicated by 20 years of monitoring results.

Response

The basic configuration of the groundwater arsenic plume, as defined by the existing monitoring well network and results, has remained relatively stable at the MRSOU. EPA believes the *Proposed Plan* accurately represented the possibility of fluctuation of the aquifer contamination under certain circumstances.

5) Proposed Plan, page 14, first paragraph of "Ecological Risks"

Summary of Comments

The *Proposed Plan* states that "Concentrations were likely higher during the peak of this event (ice scour), but unfortunately, samples could not safely be collected during the peak..." Atlantic Richfield Company believes that this is misleading and disregards the water quality data collected by Missoula County during the event, and which possibly occurred through the peak of the event.

Response

The statement in the *Proposed Plan* is made in reference to the USGS's inability to collect depth integrated samples at their gauging station above Missoula during the ice scour event because of personnel safety issues. River discharge with ice flows peaked at 12,400 cfs above Missoula. Missoula County resorted to the collection of grab samples to characterize water quality during the event as a last resort. Grab samples, although useful, are not as accurate as a depth integrated sample, nor were the samples matched to river discharge stages, which led EPA and the State to conclude that the peak period of the event may not have been sampled.

6) Proposed Plan, page 15, first paragraph of initial bullets under "Preliminary Remediation Goals"

Summary of Comments

Text of several of the preliminary remediation goals (PRGs) were changed or added to, from the original PRGs provided to Atlantic Richfield Company during preparation of the FS. EPA's original PRGs should replace the revised PRGs in the cleanup proposal. More specifically, the PRG stating "protect downstream fish and macroinvertebrate populations from releases of contaminated reservoir sediments which occur with ice scour and high flow events" did not end with the qualifying text "by reducing dissolved copper and zinc concentrations below Toxicity Reference Values (TRVs) for trout." Atlantic Richfield Company believes referencing the TRVs is appropriate because they are site specific, risked-based criteria for the protection of downstream aquatic life. Atlantic Richfield Company also believes that EPA's and the State's temporary construction standards are arbitrary and they should use the TRVs.

Atlantic Richfield Company also noted a change to the wetlands PRG from "protecting wetlands to the maximum extent possible" to "protect wetlands through avoidance of loss or replacement of wetlands." Further changes to the wetlands RAO included: "Provide compliance with ESA and wetland protection through consultation with USFWS, the Confederated Salish and Kootenai Tribes and relevant State agencies." By making these changes, EPA appears to conclude that replacing the approximately 130 acres of onsite wetlands is equivalent to the reconstructed riverine wetlands.

Response

The PRGs were appropriately modified for the *Proposed Plan* and *Record of Decision*, based on the current site conditions, analysis, and site needs. The NCP allows PRGs to be modified as the remedial investigation and feasibility study progresses and the remedial action is selected. EPA agrees that protection of downstream fish and macroinvertebrate population is important. The remedy, as described in Section 12 of this *Record of Decision*, will greatly reduce the potential for mobilization of any contaminated sediment by ice scour or high flow events through removal of contaminated sediment in Area 1 and construction of a new channel and floodplain. State restoration activities will also help limit the erosion or scour of remaining sediment that might harbor lower level concentrations of arsenic and metals. EPA disagrees with the comment about the temporary water quality construction standards. The temporary standards were established by EPA and DEQ, in consultation with FWP, to protect human health and prevent acute impacts to the downstream fishery, including bull trout. Reference to exceedance of the temporary standards during construction activities will take into consideration loading from upstream sources.

In reference to Atlantic Richfield Company's concern about the reconstruction of wetlands, please refer to item number 2 above.

7) Proposed Plan, page 16, bullets under "Groundwater PRAOs and Surface Water PRAOs"

Summary of Comments

The Groundwater and Surface Water PRAOs were changed in the *Proposed Plan*. For the groundwater PRAO, returning it to "its beneficial use within a reasonable time frame and preventing ingestion until drinking water standards are achieved," needs to be qualified with "if practicable." For surface water, the PRAO references achieving Federal Ambient Water Quality Criteria (FAWQC). Atlantic Richfield Company believes it should read, "achieve TRVs, which are fully protective of aquatic life."

Response

EPA believes that implementation of the remedy, as described in this *Record of Decision* (Section 12), will result in restoration of the aquifer to its beneficial use within a couple of decades, if not sooner. Thus there is no need for the qualifying phrase. EPA is striving for a remedy that will meet all ARARs. The FAWQC are surface water ARARs, the TRVs for trout, although site-specific, are not. The FAWQC values are identical to the Montana WQB-7 acute and chronic standards except they are for dissolved rather than total recoverable analyses. Under CERCLA law, it is appropriate to use such standards as ARARs and remedial goals.

8) Proposed Plan, page 18, last paragraph of "Applicable or Relevant and Appropriate Requirements"

Summary of Comments

Atlantic Richfield Company believes, as stated in the *Proposed Plan*, "Soils with low levels of contaminants left in place will be primarily out of the floodplain after dam removal and the remedial action is completed. State floodplain and solid waste ARARs do not apply to this material." However, they also believe it should apply regardless of the location of the soil.

Response

EPA acknowledges this comment. A detailed consideration of this comment is not required, and the ARARs attachment to the *Record of Decision* accurately describes the treatment of soils and mixed waste under ARARs at the Milltown Site.

9) Proposed Plan, page 21, first paragraph

Summary of Comments

Atlantic Richfield Company disagrees with EPA's evaluation that Alternative 2A doesn't provide permanent protection from dam failure and ice scour. Atlantic Richfield Company believes that a FERC safety upgrade to enhance the stability of the structure, coupled with an inflatable crest, would result in adequate permanence for the structure.

Response

The remedy as presently described in this *Record of Decision* is truly a permanent solution to a 100-year-old problem. Retaining the dam with the associated sediments perpetuates the status quo, which is not an acceptable solution to the problem. As noted above, the dam owner, NorthWestern Corporation, has indicated it did not wish to spend the substantial capital it would take to improve the facility to current standards, because the dam is not a revenue producing dam, and there is no guarantee that continued dam maintenance over time would be performed by the dam owners or the Atlantic Richfield Company.

10) Proposed Plan, page 23, first paragraph

Summary of Comments

The *Proposed Plan* states that EPA expects fill material for the floodplain reconfiguration to come from the excavation of a downstream repository. Alternate sources of backfill borrow material closer to the site should be considered.

Response

EPA agrees. Borrow sources closer to the reservoir may be utilized for construction of the floodplain. Area 1 material may also be available for fill or topsoil, if it meets appropriate standards.

11) Proposed Plan, page 23, Exhibit 8 Table

Summary of Comments

The sediment thickness listed under Area 3 needs to be updated in Exhibit 8 to reflect sediment core data collected during the 2002 drawdown. The thickness range should read 5 to 21 feet.

Response

EPA agrees. This information is updated in this *Record of Decision*, Exhibit 2-10.

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12) Proposed Plan, page 28, first paragraph of Sediment Removal, Dewatering, Transportation and Disposal

Summary of Comments

Atlantic Richfield Company requests that Cleanup Proposal language discussing sediment removal, emphasize that removal will be tied to a specific depth contour elevation, not based on concentration criteria.

Response

EPA concurs that the initial depth of sediment removal in Area 1 will correspond to a pre-determined contour elevation that will be determined during remedial design based on concentration criteria. Section 12.3, *Dam and Sediment Removal*, of Part 2 of this *Record of Decision*, describes the conceptual removal process as currently envisioned under the remedy. The actual details of the removal process may change as remedial design proceeds and may provide for confirmation sampling and possible adjustments during or following initial excavation.

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13) Proposed Plan, page 28, second paragraph of Sediment Removal, Dewatering, Transportation and Disposal

Summary of Comments

Implementation of installation of sheet piling and removal of the upper 15 percent of sediment from Area 1 will require a drawdown of the reservoir. The requirement for drawdown, along with any proposed evaluations of the potential environmental consequences (scouring, etc.) should be identified and discussed in the cleanup proposal.

Response

EPA agrees with the comment. During the evaluation of the comments, EPA and Atlantic Richfield Company put considerable effort into modeling potential sediment scour scenarios. The results of these efforts influenced the approach to the remedy and removal of the sediment. Sequencing of drawdowns, dam removals, bypass construction and water quality monitoring are described in detail in Sections 12.4 and 12.5 of Part 2 of this *Record of Decision.*

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14) Proposed Plan, page 29, last paragraph

Summary of Comments

The proposed daily surface water quality monitoring frequency for TSS and dissolved/total metals may be appropriate for a limited time during construction startup and during initiation of new types of construction and/or dam operational activities, but an allowance should be provided for a reduction in surface water monitoring frequency after these initial periods. Continuous turbidity monitoring at the USGS gauging station above Missoula could be correlated with TSS concentrations to provide a continuous reading of TSS and actual sampling could be reduced to coincide with periods of high turbidity/TSS.

Response

EPA understands Atlantic Richfield Company's comment and will employ an efficient surface water monitoring program during implementation of the remedy. This program will incorporate continuous monitoring of turbidity, daily monitoring of TSS, and dissolved and total metals and arsenic (USGS Station 12340500—above Missoula). Results of the daily monitoring will be evaluated against Temporary Surface Water Quality Standards established by EPA and DEQ to be applied during construction. The temporary standards were established to protect human health and prevent acute impacts to the downstream fisheries, including bull trout. Periodic downstream monitoring of TSS, metals, and arsenic at pre-determined locations immediately above Thompson Falls Reservoir will also be incorporated into the monitoring plan (see Sections 12.5 and 12.7 in Part 2 of this *Record of Decision* for more details).

15) Proposed Plan, page 30, second paragraph

Summary of Comments

Caged fish studies and fish surveys, as proposed in the *Proposed Plan*, are confounded by many factors unrelated to metals/sediment release and have shown a high degree of variability. Requiring these methods of monitoring would likely be of limited benefit and would not justify the cost.

Response

The specifics of the aquatic biomonitoring program to be implemented by the remedy will be crafted by EPA, DEQ, USFWS, and FWP as part of the remedial design. The program is discussed in Part 2 of this *Record of Decision*, in Sections 12.5 and 12.7.

16) Proposed Plan, page 30, Exhibit 12

Summary of Comments

The temporary water quality standards for construction proposed by EPA are not based on the database of site specific toxicity (except for copper) developed for the Clark Fork River. Temporary and final water quality criteria for the MRSOU should be based onsite-specific toxicity data as defined by the dissolved metal TRVs for the Clark Fork River, which are considered conservative. Any exceedances of the temporary criteria should determine whether it is from construction activities, upstream loading, or any other sources of metals/TSS unrelated to construction activities.

Response

As part of the remedy, EPA has invoked a waiver of MRSOU final ambient surface water standards during construction activities because exceedances of final standards is unavoidable during river construction activities. The temporary construction standards were established by EPA and DEQ, in consultation with FWP, to protect human health and prevent acute impacts to downstream fisheries, including bull trout, and are appropriate and protective. Reference to these standards during remedy implementation will consider whether an exceedance of a temporary standard is the result of construction activities or loading from upstream or other sources (see Section 12.7.2 of Part 2 of this *Record of Decision* for more details).

17) Proposed Plan, page 30, last paragraph

Summary of Comments

Atlantic Richfield Company acknowledges EPA's need to coordinate the remedial action and facilitate fish passage. Atlantic Richfield Company recommends that EPA emphasize, and more favorably weigh, the long term needs and benefits of completing the project in a timely manner over the short term benefits of facilitating fish passage.

Response

The construction process for implementing the remedy has evolved since this comment was written. The remedy as described in this *Record of Decision* will accommodate an aggressive construction schedule while facilitating the passage of fish. EPA and other agencies agree that the successful implementation of the remedy, in a timely and efficient manner, will also allow for fish passage. Section 12.3 of Part 2 of this *Record of Decision* provides a discussion about the remedial construction process and sequencing of activities.

18) Proposed Plan, page 31, second paragraph of "Channel Reconstruction"

Summary of Comments

The conceptual approach and an estimate for the volume of floodplain backfill is presented in the *Proposed Plan*. An alternate approach that utilizes less backfill should be considered.

Response

Since this comment was written, a revised approach was proposed by Atlantic Richfield Company, reviewed and evaluated by EPA, and accepted. The remedy as described in Section 12 of this *Record of Decision*, incorporates the new approach, including the identification of local sources of backfill material.

19) Proposed Plan, page 31, first paragraph of "Milltown Dam Removal"

Summary of Comments

The *Proposed Plan* identifies that dam removal would be completed after the sediment removal and channel/control structure construction work was completed. Under an alternate plan that uses a dry removal approach, the benefits of early dam removal must be considered in sequencing removal of the spillway and radial gate section of the dam.

Response

A revised approach, which evaluates the merits of an early dam removal and dry excavation, was presented to EPA for consideration by Atlantic Richfield Company and its contractor. The remedy, as described in Section 12 of this *Record of Decision*, incorporates a refined version of this approach. A sustained drawdown, construction of a bypass channel, and early removal of the Milltown Dam spillway are all components of the remedy.

20) Proposed Plan, page 33, first two bullets

Summary of Comments

The *Proposed Plan* identifies a requirement for Atlantic Richfield Company to continue funding for maintaining the replacement water supply for Milltown residents and making contingency funds available to reconfigure, expand or update replacement water supplies. The cleanup proposal needs to recognize that Atlantic Richfield Company already meets these requirements through its settlement with the Milltown Water Users Association.

Response

The requirements are appropriate for the *Record of Decision*. If the RPs can demonstrate that the continuation of the temporary alternative water supply has been accomplished under pre-existing agreements in a satisfactory manner, that will be accepted by EPA.

21) Proposed Plan, page 34, sixth bullet

Summary of Comments

The *Proposed Plan* includes a bullet statement that indicates that the former Clark Fork River channel will be backfilled as part of the re-contouring and stabilization of the new floodplain. The Cleanup Proposal should clarify that the use of imported backfill is not anticipated outside of Area 1 and that recontouring of Area 2 and 3 will be done by the regrading of existing soils and sediments.

Response

The remedy provides a conceptual description of the backfilling of the abandoned Clark Fork River channel with borrow material that originates on or near the site. The specific details relevant to the design, construction, and contouring of the floodplain will be developed, reviewed, and evaluated as part of remedial design phase of the project.

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5 Stakeholder and RP Categorized Comments

All of the comments provided by stakeholders and the Executive Summary of the RP's comments on the *Revised Proposed Plan* are contained on the attached CD-ROM. To use this CD, insert it in the CD-ROM drive of your computer. The CD should auto-launch in Adobe Acrobat Reader as a PDF file. If CD does not auto-launch, click on "Start," and select "Run" in Windows. Type "D:/start.pdf," where "D" is your CD-ROM drive.

For stakeholder comments, the files are grouped into the following commenter types:

- **Milltown Residents:** Milltown Area Residents (Bonner, Piltzville, Turah, Milltown, West Riverside)
- **Missoula Residents:** Missoula Residents
- **Upstream Residents:** Upstream Residents (Drummond, Clinton, Deer Lodge, Garrison Anaconda, Butte)
- **Downstream Interests:** Residents Downstream of Missoula (Frenchtown, Huson Alberton, Rivulet, Tarkio, Superior)
- **Others:** Other individuals from outside the CFB
- **No Address:** People who did not supply an address
- **Meeting:** Oral comments provided to EPA at meeting or hearing
- **Group:** Citizen Groups and Organizations
- **Local Government:** City and County agencies, Conservation District Board
- **Elected Officials:** Mayors, senators, representatives, and other elected officials
- **Natural Resources Trustees:** Federal, Tribal, and State Trustees
- **Corporate Interests:** Corporate entities such as Mountain Water Co., Avista, PPL, etc.
- **RP:** Potentially Responsible Party comments (Atlantic Richfield Company and NorthWestern Corporation)

Upon opening the file, a table of contents is provided with the letter identification number and the commenter's name. For each letter, the original comment document appears on the left-hand side of the page. This document is marked with lines and numbers for where each comment within the document begins and ends. To the right, the number associated with each comment is listed, and the category and subcategory is identified. To see a response to a particular comment, refer to the specific category and subcategory in Sections 2 or 3 of this *Responsiveness Summary*. For the RPs, the comments were not categorized, but rather were responded to comment-by-comment in Section 4, *RP Issues and Lead Agency Responses*.

If you do not have access to a computer, you may request a paper copy of your comments (a copying fee will be charged). To request this, please contact:

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Helena, MT 59626
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(406) 457-5042

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2/18/2005

NOTICE

This item(s) is not suitable for microfilming, but is available for review at the Environmental Protection Agency, Region VIII Superfund Records Center, Helena, Montana

TITLE: "MILLTOWN RESERVOIR SEDIMENTS OPERABLE UNIT (OU) OF THE MILLTOWN RESERVOIR/CLARK FORK RIVER SUPERFUND SITE RECORD OF DECISION (ROD)" (ATTACHED CD ROM OF STAKEHOLDER AND PRP COMMENTS)

DATE: DEC. 2004

ITEM DESCRIPTION: CD ROM: STAKEHOLDER AND PRP CATEGORIZED COMMENTS

FILE: 3040606 DOCNO: **506596**

See R8 SDMS Documents
1097886
1097887
1097888
1097889

Milltown Reservoir Sediments Operable Unit

of the Milltown Reservoir/Clark Fork River Superfund Site

Record of Decision

Part 4: Acronyms and Abbreviations, and References

U.S. Environmental Protection Agency Region 8

10 West 15th Street
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December 2004

Contents

Acronyms and Abbreviations

ARAR	Applicable or Relevant and Appropriate Requirements for cleanup, such as regulatory requirements
ATSDR	Agency for Toxic Substances and Disease Registry
BMPs	Best Management Practices
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act; also known as the Federal Superfund law
CFRTAC	Clark Fork River Technical Assistance Committee
CFR	Code of Federal Regulations
cfs	cubic feet per second
CSKT	Confederated Salish and Kootenai Tribes
CT	community type
cy	cubic yards
DCRP	Draft Conceptual Restoration Plan
DEQ	Montana Department of Environmental Quality
DOI	U.S. Department of the Interior
DQO	Data Quality Objective
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EQIP	Environmental Quality Incentives Program
FAWQC	Federal Ambient Water Quality Criteria
FDWR	Federal Drinking Water Standards
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FWP	Montana Fish, Wildlife, and Parks
I-90	Interstate 90
IC	Institutional Control

IRD	inflatable rubber dam
MCA	Montana Code Annotated
MCCHD	Missoula City/County Health Department
MCL	Maximum Concentration Level
MCLG	Maximum Contaminant Level Goal
mcy	million cubic yards
MDHES	Montana Department of Health and Environmental Science
MEAC	Milltown Endangerment Assessment Committee public group
MESS	Milltown EPA Superfund Site public group
mg/kg	milligrams per kilogram
mg/l	milligrams per liter
MRSOU	Milltown Reservoir Sediments Operable Unit
MTAC	Milltown Technical Advisory Committee
MWUA	Montana Water Users Association
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPL	National Priorities List; the Superfund list of sites
NPV	net present value
NRDP	Natural Resource Damages Program
OU	operable unit
PCB	Polychlorinated biphenyl
PDF	portable document format (Acrobat Reader)
ppb	parts per billion
ppm	parts per million
RAO	Remedial Action Objective
RG	Remedial Goal
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study

RP	Responsible Party
SAA	sediment accumulation area
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Office
SPCC	Spill Prevention, Control, and Countermeasures
TAG	Technical Assistance Grant
TCRA	Time Critical Removal Action
TMDL	Total Maximum Daily Load
TRV	toxicity reference values
TSS	total suspended solids
µg/l	micrograms per liter
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

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Milltown Reservoir Sediments Operable Unit

of the Milltown Reservoir/Clark Fork River Superfund Site

Record of Decision

Appendix A:
Identification and Description of Applicable or Relevant and Appropriate Requirements

U.S. Environmental Protection Agency Region 8

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December 2004

APPENDIX A

Identification and Description of Applicable or Relevant and Appropriate Requirements for the Record of Decision

MILLTOWN RESERVOIR/CLARK FORK RIVER SUPERFUND SITE RESERVOIR SEDIMENTS OPERABLE UNIT (OU 3)

DECEMBER 2004

List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirements
ATSDR	Agency of Toxic Substances and Disease Registry
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BPCTCA	Best Practicable Control Technology Currently Available
BPJ	Best Professional Judgment
BTCA	Best Technology Currently Available
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended
DEQ	State of Montana Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
HWM	Hazardous Waste Management
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MGWPCS	Montana Groundwater Pollution Control System
MPDES	Montana Pollutant Discharge Elimination System
NCP	National Contingency Plan, as amended
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NPL	National Priorities List
NPDES	National Pollutant Discharge Elimination System
POTW	Public Owned Treatment Works
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
RD/RA	Remedial Design and Remedial Action
ROD	Record of Decision
SHPO	State Historic Preservation Officer (Montana)
SIP	State Implementation Plan
TBC	To Be Considered
TU	Turbidity Unit
UIC	Underground Injection Control
WQB-7	Circular WQB-7, Montana Numeric Water Quality Standards

Contents

Introduction

Section 121(d) of CERCLA, 42 U.S.C. § 9621(d), certain provisions of the current National Contingency Plan (the NCP), 40 CFR Part 300, and guidance and policy issued by the Environmental Protection Agency (EPA) require that remedial actions taken pursuant to Superfund authority shall require or achieve compliance with substantive provisions of applicable or relevant and appropriate standards, requirements, criteria, or limitations from state environmental and facility siting laws, and from federal environmental laws, at the completion of the remedial action, during the implementation of the remedial action, or both, depending on the nature of the requirements, unless a waiver is granted[1]. If contaminant or location specific ARARs are not being met before the commencement of a remedial action, it is not necessary to invoke a waiver to justify their non-attainment during the action, although they must be attained (or appropriately waived) for remedial action to be complete and the remedy to be successful[2]. These requirements are threshold standards that any selected remedy must meet, unless adequate basis for a waiver is present. See Section 121 (d) (4) of CERCLA, 42 U.S.C. § 9621 (d) (4); 40 CFR § 300.430 (f) (1). EPA calls standards, requirements, criteria, or limitations identified pursuant to section 121 (d) "ARARs," or applicable or relevant and appropriate requirements.

ARARs are either applicable or relevant and appropriate. Applicable requirements are those standards, requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstance found at a CERCLA site. 40 CFR § 300.5. Relevant and appropriate requirements are those standards, requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to hazardous substances, pollutants, contaminants, remedial actions, locations, or other circumstances found at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site such that their use is well suited to the particular site. Id. Factors which may be considered in making this determination are presented in 40 CFR 300.§ 400(g) (2). Compliance with both applicable and relevant and appropriate requirements is mandatory, unless compliance is waived. 42 U.S.C. § 121(d)(4); 40 CFR § 300.430(f)(ii)(B).

Each ARAR or group of related ARARs identified here is followed by a specific statutory or regulatory citation, a classification describing whether the ARAR is applicable or relevant and appropriate, and a description which summarizes the requirements, and addresses how and when compliance with the ARAR will be measured (some ARARs will govern the conduct of the remedial action, some will define the measure of success of the remedial

[1] See 55 Fed.Reg. 8666, 8755 (March 8, 1990)

[2] EPA CERCLA Compliance with Other Laws Manual 1-8 (OSWER # 9234.1-01, August 1988)

action, and some will do both)[3]. The descriptions given here are provided to allow the user a reasonable understanding of the requirements without having to refer constantly to the statute or regulation itself. However in the event of any inconsistency between the law or regulations and the summary provided in this document, the applicable or relevant and appropriate requirement is ultimately the requirement as set out in the law or regulation, rather than any paraphrase provided here.

Also contained in this list are policies, guidance or other sources of information which are "to be considered" in the design and implementation of the Record of Decision (ROD). Although not enforceable requirements, these documents are important sources of information which EPA and the State of Montana Department of Environmental Quality (DEQ) may consider during implementation of the remedy, especially in regard to the evaluation of the remedy's success in addressing public health and environmental risks.

Finally, this list contains a non-exhaustive list of other legal provisions or requirements which should be complied with during the implementation of the ROD[4].

ARARs are divided into contaminant specific, location specific, and action specific requirements, as described in the NCP and EPA guidance. For contaminant specific ARARs, ARARs are listed according to the appropriate media.

Contaminant specific ARARs include those laws and regulations governing the release to the environment of materials possessing certain chemical or physical characteristics or containing specific chemical compounds. Contaminant specific ARARs generally set health or risk based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment. Location specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of cleanup activities because they are in specific locations. Location specific ARARs relate to the geographic or physical position of the site, rather than to the nature of site contaminants. Action specific ARARs are usually technology or activity based requirements or limitations on actions taken with respect to hazardous substances.

Only the substantive portions of the requirements are ARARs[5]. Administrative requirements are not ARARs and thus do not apply to actions conducted entirely on-site. Administrative requirements are those which involve consultation, issuance of permits, documentation, reporting, record keeping, and enforcement. The CERCLA program has its own set of administrative procedures which assure proper implementation of CERCLA. The application of additional or conflicting administrative requirements could result in delay or

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[3] 40 CFR § 300.435(b)(2); Preamble to the Proposed NCP, 53 Fed.Reg. 51440 (December 21, 1988); Preamble to the Final NCP, 55 Fed.Reg. 8755-8757 (March 8, 1990)

[4] 40 CFR § 300.400(g)(3); 40 CFR § 300.515(h)(2); Preamble to the Final NCP, 55 Fed.Reg. 8744-8746 (March 8, 1990)

[5] 40 CFR § 300.5. See also Preamble to the Final NCP, 55 Fed.Reg. 8756-8757 (March 8, 1990)

confusion[6]. Provisions of statutes or regulations which contain general goals that merely express legislative intent about desired outcomes or conditions but are non-binding are not ARARs.[7]

Many requirements listed here are promulgated as identical or nearly identical requirements in both federal and state law, usually pursuant to delegated environmental programs administered by both EPA and the states, such as many of the requirements of the federal Clean Water Act and the Montana Water Quality Act. The Preamble to the final NCP states that such a situation results in citation to the state provision as the appropriate standard, but treatment of the provisions as a federal requirement. ARARs and other laws which are unique to state law are identified separately by the State of Montana.

This list constitutes EPA's and DEQ's detailed description of ARARs for use in the implementation of the Milltown Reservoir/Clark Fork River Site, Milltown Reservoir Sediments operable unit (MRSOU), and resulting remedial design and remedial action decisions.

An ARAR waiver of water quality standards is identified in this document, and this waiver applies during construction activities as a temporary waiver. Replacement water quality standards are identified to govern the project during the time the temporary, construction waiver is in effect. Additionally, the document acknowledges the waiver of in stream copper standards at the upstream Clark Fork River operable unit and the effect of that waiver at the MRSOU. ARAR waivers can be invoked after the ROD is issued if necessary and appropriate, and these waivers, if granted, will be documented separately.

The ARAR analysis is based on section 121(d) of CERCLA, 42 U.S.C. § 9621 (d); CERCLA Compliance with Other Laws Manual, Volumes I and II; OSWER Directives 9234.1-01 and -02 (August 1988 and August 1989 respectively; various CERCLA ARARs Fact Sheets issued as OSWER Directives; the Preamble to the Proposed NCP, 53 Fed.Reg. 51394 et seq. (December 21, 1988); the Preamble to the Final NCP, 55 Fed.Reg. 8666-8813 (March 8, 1990); and the NCP, 40 CFR Part 300; other applicable guidances; and the substantive provisions of law discussed in this document.

[6] Preamble to the Final NCP, 55 Fed.Reg. 8756-8757 (March 8, 1990); Compliance with Other Laws Manual, Vol.1, pp. 1-11 - 1-12

[7] Preamble to the Final NCP, 55 Fed.Reg. 8746 (March 8, 1990)

Federal ARARS

I. Federal Contaminant Specific Requirements

A. Groundwater Standards—Safe Drinking Water Act (Relevant and Appropriate)[8]

The National Primary Drinking Water Standards (40 CFR Part 141), better known as maximum contaminant levels and maximum contaminant level goals (MCLs and MCLGs), are not applicable to the MRSOU because the affected, contaminated aquifer underlying the area is not a current public water system, as defined in the Safe Drinking Water Act, 42 U.S.C. § 300f(4). These standards are relevant and appropriate standards, however, because the groundwater in the area is a potential source of drinking water and was once used as a drinking water source, and because the NCP directs EPA to seek ground water cleanup and restoration within reasonable time frames if practicable any time the ground water is classified by the State as a usable groundwater aquifer. Groundwater use through private wells occurred extensively in the area, especially in the town of Milltown, until a replacement water supply was established in an early EPA remedial action at this site. Because that alternative water supply may not be permanent, the aquifer remains a potential drinking water source. In addition, the aquifer discharges to the Clark Fork River, which is designated as a potential source of drinking water. Since the Clark Fork River is also a potential source of drinking water in the areas at and downstream of the Milltown Reservoir, these standards are relevant and appropriate for that surface water as well.

Use of these standards for this action is fully supported by EPA regulations and guidance. The Preamble to the NCP clearly states that MCLs are relevant and appropriate for groundwater that is a current or potential source of drinking water (55 Fed.Reg. 8750, March 8, 1990), and this determination is further supported by requirements in the regulations governing conduct of the RI/FS studies found at 40 CFR § 300.430(e)(2)(i)(B). EPA's guidance on Remedial Action for Contaminated Groundwater at Superfund Sites states that "MCLs developed under the Safe Drinking Water Act generally are ARARs for current or potential drinking water sources." MCLGs which are above zero are relevant and appropriate under the same conditions (55 Fed.Reg. 8750-8752, March 8, 1990). See also, State of Ohio v. EPA, 997 F.2d 1520 (D.C. Cir. 1993), which upholds EPA's application of MCLs and non-zero MCLGs as ARAR standards for groundwater which is a potential drinking water source.

As noted earlier, standards such as the MCL and MCLG standards are promulgated pursuant to both federal and state law. Under the Safe Drinking Water Act, EPA has granted the State of Montana primacy in implementation of the Safe Drinking Water Act. The State has promulgated its own public water supply ground water standards through the Public Water Supply Act for most contaminants of concern, primarily through

[8] 42 U.S.C. §§ 300f et seq.

incorporation by reference of the federal standard. These standards, when the same or more stringent than the federal standard, are also identified here.

Chemical	MCLG	MCL
Arsenic	NA	10 ug/l[9]
Cadmium	5 ug/l[10]	5 ug/l[11]
Copper	1300 ug/l[12]	1300 ug/l[13]
Lead	NA [14]	15 ug/l[15]

All ground water standards are measured as dissolved constituents[16]. All are identified as key Performance Standards in the ROD.

These standards incorporate potentially relevant and appropriate Resource Conversation Act (RCRA) standards for groundwater found at 40 CFR Part 264, Subpart F, which is incorporated pursuant to state law at ARM 17.53.801. The RCRA standards are the same or less stringent than the MCLs or MCLGs identified above. These standards would also be applicable to the Clark Fork River ambient surface water, if State water quality standards are less stringent for human health protection or are not present. In such a case, they would be measured as dissolved standards for ambient surface water.

For ground water in compliance with standards in and downstream of the MRSOU, including the Missoula sole source aquifer, the State's non-degradation standard applies. That standard is described in the State ground water ARAR section, infra.

The groundwater ARARs are also important for determining when the contingency plan for replacement of water supplies is triggered under the ROD. As noted in section 12 of the ROD, uncontaminated ground water in and near the MRSOU area will be monitored, and if contamination unexpectedly spreads during the implementation of the remedial action such that these ARAR standards are exceeded in a domestic water supply well for a statistically significant period of time, a new water supply shall be provided to the well user.

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[9] 40 CFR §§ 141.11(b) and 141.62

[10] 40 CFR § 141.51

[11] 40 CFR § 141.62

[12] 40 CFR § 141.51

[13] 40 CFR § 141.80(c)(2) The requirement is an action level rather than a simple numerical standard.

[14] The MCLG for arsenic and lead is zero, which is not an appropriate standard for Superfund site cleanups.

[15] 40 CFR § 141.80(c)(1). The requirement is an action level rather than a simple numerical standard.

[16] If water is measured at the tap, then total methodologies are necessary for measurement of these standards.

B. Surface Water—Ambient and Point Source Discharges—Clean Water Act (Applicable)

CERCLA and the NCP provide that federal water pollution criteria (FWQC) developed pursuant to the federal Clean Water Act, 33 U.S.C. §§ 1251 et seq., that match designated or anticipated surface water uses are the usual surface water standards to be used at Superfund cleanups, as relevant and appropriate standards, unless the state has promulgated surface water quality standards pursuant to the delegated state water quality act. The State of Montana has designated uses for the Clark Fork River, and has promulgated specific numeric water quality standards accordingly. Those standards as well as other surface water standards are included in the State ARARs identified in Section IV.A. below.

If State standards for the contaminants listed in Section IV.A. below are changed to be less stringent than existing FWQC, then FWQC will be identified as the appropriate ARARs. At the upstream Clark Fork River operable unit, federal FWQC for copper was identified as a replacement standard for copper. The application of the in stream standards for the upstream Clark Fork River operable unit, including the replacement FWQC standard for copper, is discussed in Section IV.A.1. below. The FWQC standards are not specifically identified here.

C. Surface Water—Ambient and Point Source Discharges—Temporary Standards (Applicable)

As described in the ROD, the removal of sediments and the dam will unavoidably cause conditions in which surface water ARAR standards will be exceeded.

EPA, in consultation with the State DEQ, hereby invokes a waiver of surface water ARARs for the MRSOU, based on section 121(d)(4)(A) of CERCLA. This provision of CERCLA allows EPA to waive standards on an interim basis. Further explanation of this waiver is found in the ROD. This waiver is being applied consistent with the substantive requirements of sections 308 and 318 of the State's Clean Water Act, §§ 75-5-308, 75-5-318, MCA, as described below.

The temporary construction standards, which apply to point sources and as in-stream ambient standards, are:

Cadmium-Acute FWQC (dissolved)	2 µg/L	Short-term (1 hour)
Copper-80% of the TRV (dissolved) (at hardness of 100 mg/L)	25 µg/L	Short-term (1 hour)
Zinc-Acute FWQC (dissolved)	117 µg/L	Short-term (1 hour)
Lead-Acute FWQC (dissolved) -DWS (dissolved)	65 µg/L 15 µg/L	Short-term (1 hour) Long-term (30-day average)
Arsenic-Acute FWQC (dissolved) -DWS (dissolved)	340 µg/L 10 µg/L	Short-term (1 hour) Long-term (30-day average)
Iron-FWQC (dissolved)	1,000 µg/L	Short-term (1 hour)

Total Suspended Solids (TSS)	550 mg/L 170 mg/L 86 mg/L	Short-term (day) Mid-term (week) Long-term (season)

All hardness related FWQC values assume a hardness of 100 mg/L
TRV = Toxicity Reference Value, developed in the Ecological Risk Assessment for the Clark Fork River Operable Unit
FWQC = Federal Ambient Water Quality Criteria
DWS = Federal Drinking Water Standard

D. Air Standards—Clean Air Act (Applicable)

Federal air quality standards are not currently exceeded in the MRSOU. Limitations on air emissions resulting from cleanup activities or emissions resulting from wind erosion of exposed hazardous substances are set forth in the action specific requirements, below, in Sections III.B. and VI.C. Certain OSHA standards for protection of workers would be monitored for during construction activities to ensure protection of workers' health.

II. Federal Location Specific Requirements

A. Fish and Wildlife Coordination Act (Applicable)

These standards are found at 16 U.S.C. §§ 661 et seq. and 40 CFR § 6.302(g). They require that federally funded or authorized projects ensure that any modification of any stream or other water body affected by a federally funded or authorized action provide for adequate protection of fish and wildlife resources. Compliance with this ARAR necessitates EPA consultation with the U.S. Fish and Wildlife Service (USFWS) and the State of Montana Department of Fish, Wildlife, and Parks. Extensive consultation occurred with these agencies during the selection of the MRSOU ROD, and further consultation with these agencies will occur during cleanup implementation, and specific mitigative or other measures may be identified to achieve compliance with this ARAR as the MRSOU ROD is implemented. The purpose of consultation is to develop measures to prevent, mitigate, or compensate for project-related losses to fish and wildlife. Mitigative measures must be performed by the persons who implement any selected remedy.

B. Floodplain Management Order (Applicable)

This requirement (40 CFR Part 6, Appendix A, Executive Order No. 11,988) mandates that federally funded or authorized actions within the 100 year floodplain avoid, to the maximum extent possible, adverse impacts associated with development of a floodplain. Compliance with this requirement is detailed in EPA's August 6, 1985, "Policy on Floodplains and Wetlands Assessments for CERCLA Actions."

The ROD, as supplemented by the natural resource damage trustees' Restoration Plan, is expected to improve the floodplain at the MRSOU substantially. Findings relative to adverse impacts on floodplain are not required for this project. EPA will ensure coordination of this project with state and local floodplain management authorities during design, and appropriate mapping of the floodplain after completion of the ROD and Restoration Plan. Any other substantive provisions of applicable federal or state floodplain management regulations will be complied with.

C. Protection of Wetlands Order (Applicable)

This requirement (40 CFR Part 6, Appendix A, Executive Order No. 11,990) mandates that federal agencies and potentially responsible parties (PRPs) avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists. Section 404(b)(1), 33 U.S.C. § 1344(b)(1), also prohibits the discharge of dredged or fill material into waters of the United States. Together, these requirements create a "no net loss" of wetlands standard. This ARAR is not a ban on wetland destruction, but is instead a mandate for no net loss of wetlands, with a preference for avoiding wetland destruction if practicable.

Compliance with this ARAR will be achieved through EPA consultation with the U.S. Fish and Wildlife Service, to determine the existence and category of wetlands present at the site, and any avoidance or mitigation and replacement which may be necessary. Avoidance, mitigation, or replacement activities will be done by the persons who implement any selected remedy. Avoidance of wetland destruction is not feasible for this project. Mitigation of lost wetlands through compliance with the no net loss standard is a specific requirement of the MRSOU selected remedy, and will be further examined and detailed during remedy implementation. In February 1999, ARCO published a draft report titled "Wetlands and Threatened/Endangered Species Inventory with Determination of Effective Wetland Area." This document establishes the value and extent of wetlands within the MRSOU, and found jurisdictional wetlands over 297 acres and 125 acres of shallow water habitat, divided into 83 jurisdictional wetland acres and 60 shallow pool acres found in the reservoir pool area, and 213.7 jurisdictional wetland acres and 64 shallow pool acres found in the braided river area. These equate to a functionally effective wetland area (FEWA) of 126 acres in the reservoir pool area and 253 FEWA in the braided river area. EPA approved ARCO's August 1992 Evaluation Form for Determining Wetland Functional Value and Effective Wetland Area in Upper Clark Fork River Superfund Sites for use in wetland evaluations. EPA has also approved of a Clark Fork Basin wide system of accounting for wetland destruction and replacement. The February 1999 draft report is currently being supplemented by ARCO.

D. The Endangered Species Act (Applicable)

This statute and implementing regulations (16 U.S.C. §§ 1531 - 1544, 50 CFR Part 402, and 40 CFR § 6.302(h)) require that any federal activity or federally authorized activity may not jeopardize the continued existence of any threatened or endangered species known to live or to have lived in the affected environment or destroy or adversely modify a critical habitat. This ARAR requires EPA to ensure that the selected remedy is sufficiently protective of the environment containing the threatened or endangered species, with an emphasis on reducing the risks from the contaminants of concern to the listed species described in the EPA risk assessment to an acceptable level, with consideration given to the special status of the listed or threatened species - see 40 CFR Sections 300.430(d)(2)(vii) and (e)(2)(i)(G) and EPA Guidance Document OSWER Dir. No. 9285.7-28P, Ecological Risk Assessment and Risk Management principles for Superfund Sites (October, 1999) page 3; and to ensure that the selected remedy is implemented in a manner such that effects on any existing threatened or endangered species from the active remedy implementation activities are avoided or mitigated - see page 4-12 of the CERCLA Compliance with Other Laws Manual: Volume II (EPA August 1989).

In February 1999 ARCO submitted a draft report titled "Wetlands and Threatened/Endangered Species Inventory with Determination of Effective Wetland Area." The MRSOU Feasibility Studies provide additional information about threatened or endangered species in the MRSOU area. These reports document the occurrence of bull trout, a threatened species, upstream, downstream and within the reservoir. The bald eagle, the peregrine falcon, and the water howellii, a listed plant, frequent or occur at the Reservoir.

EPA produced a biological assessment (BA) regarding the action proposed in the May 2004 Proposed Plan on August 17, 2004, and a BA supplement addressing the bald eagle and other protected species on October 22, 2004. The decision to perform the BA itself, rather than require the PRP to perform the study, is a site specific decision related to the nature of ARCO's objections to EPA's risk assessment and the schedule associated with this project. These documents also addressed related actions - the State of Montana's Restoration Plan, the interim operation of the Milltown Dam by NorthWestern Energy Corporation, and the removal of the Stimson Dam by the US DOI. The US FWS will issue a biological opinion (BO) on the project prior to or near the time of the Record of Decision. Continued consultation with the USFWS and the Montana Department of Fish, Wildlife, and Parks will be required as remedial designs are completed. Mitigation measures identified in the BO must be implemented by persons performing the MRSOU selected remedy, for those BO provisions applicable to it, or by the persons implementing the related actions, for those provisions applicable to those projects.

E. The National Historic Preservation Act (Applicable)

This statute and implementing regulations (16 U.S.C. § 470 et seq, 40 CFR § 6.301(b), 36 CFR Part 800) require federal agencies or federal projects to take into account the effect of any federally assisted undertaking or licensing on any district, site building, structure, or object that is included in, or eligible for, the Register of Historic Places. If effects cannot be avoided reasonably, measures should be implemented to minimize or mitigate the potential effect. In addition, Indian cultural and historical resources must be evaluated, and effects avoided, minimized, or mitigated.

In order to comply with this ARAR, EPA, DEQ, and the PRPs may consult with the appropriate federal agency, the State Historic Preservation Officer (SHPO), and the Salish-Kootenai Tribes. ARCO submitted a cultural resource inventory for the RS OU dated November 5, 1990. The Salish and Kootenai Tribe is currently cataloguing protected Indian resources, in partial compliance with this ARAR.

EPA and FERC have worked cooperatively on preparing appropriate findings and notices under the NHPA for the remediation and the restoration components of the Milltown cleanup. EPA and FERC issued a notice of effects to SHPO on August 4, 2004, which was concurred on by SHPO. Certain areas of Tribal interest will be avoided during remedial design. Mitigation activities for adverse effects which are unavoidable, and ongoing monitoring and reporting requirements, are to be described in the historical MOA and mitigation plan submitted to FERC as part of the Surrender Application for the Milltown Project.

F. Archaeological and Historic Preservation Act (Applicable)

The statute and implementing regulations (16 U.S.C. § 469 et seq., 40 CFR § 6.301(c)) establish requirements for evaluation and preservation of historical and archaeological data, including Indian cultural and historic data, which may be destroyed through alteration of terrain as a result of federal construction projects or a federally licensed activity or program. If eligible scientific, prehistorical, or archaeological data are discovered during site activities, they must be preserved in accordance with these requirements. Compliance with these requirements is also addressed in the monitoring and notice provisions of the MOA and historical mitigation plan described above.

G. Historic Sites, Buildings, and Antiquities Act (Applicable)

This statute and implementing regulations (16 U.S.C. § 461 et seq., 40 CFR § 6.310(a)) state that "in conducting an environmental review of an EPA action, the responsible official shall consider the existence and location of natural landmarks using information provided by the National Park Service pursuant to 36 CFR § 62.6(d) to avoid undesirable impacts upon such landmarks. Compliance with these requirements is also addressed in the monitoring and notice provisions of the MOA and historical mitigation plan described above.

H. Migratory Bird Treaty (Applicable)

This requirement (16 U.S.C.§§ 703 et seq.) establishes a federal responsibility for the protection of the international migratory bird resource and requires continued consultation by EPA with the USFWS during remedial design and remedial construction to ensure that the cleanup of the site does not unnecessarily impact migratory birds. Specific mitigative measures may be identified for compliance with this requirement as appropriate for performance by the persons who implement the remedy.

I. Bald Eagle Protection Act (Applicable)

This requirement (16 U.S.C. §§ 668 et seq.) establishes a federal responsibility for protection of bald and golden eagles, and requires continued consultation by EPA with the USFWS during remedial design and remedial construction to ensure that any cleanup of the site does not unnecessarily adversely affect the bald and golden eagle. Specific mitigative measures may be identified for compliance with this requirement as appropriate, and will be done by the persons who implement any selected remedy.

J. Resource Conservation and Recovery Act (Relevant and Appropriate)

Any discrete waste units created or actively managed at the MRSOU site cleanup must comply with the siting restrictions and conditions at 40 CFR § 264.18 (a) and (b). These sections require management units to be designed, constructed, operated, and maintained to avoid washout, if they are within or near the current 100 year flood plain.

K. Native American Grave Protection and Repatriation Act, 25 U.S.C. § 3001 et seq.; 43 CFR §§ 10.1 - 10.17 (Applicable or Relevant and Appropriate)

NAGPRA and its implementing regulations provide for the disposition of Native American remains and objects inadvertently discovered on federal or tribal lands after November, 1990. 25 U.S.C. Section 3002(d). If the response activities result in the discovery of Native

American human remains or related objects, the activity must stop while the head of the federal land management agency (if federal lands are involved) and appropriate Indian tribes are notified of the discovery. After the discovery, the response activity must cease and a reasonable effort must be made to protect the Native American human remains or related objects. The response activity may later resume. 42 CFR Section 10.4. Accordingly, depending on the facts of the discovery and the location of the response action, NAGPRA could be applicable or relevant and appropriate to the response action.

III. Federal Action Specific Requirements

A. Solid Waste (Applicable), Surface Mining Control and Reclamation (Relevant and Appropriate), and RCRA (Relevant and Appropriate) Requirements[17]

The contamination at the MRSOU is primarily mining waste from mining mills and smelters in Butte and Anaconda. This waste may not be RCRA hazardous waste, although EPA reserves its rights to make a more formal determination in this regard at a later date. For any active management (i.e., treatment, storage, disposal, grading, or in-situ treatment) or removal of tailings or mixed tailings and soils[18] contamination, the following requirements are ARARs. At the MRSOU remediation project, all of these requirements apply to on-site disposal of contaminated sediments retained at the site. Debris waste which is disposed of on site must comply with applicable solid waste requirements and the identified relevant and appropriate RCRA requirement.

1. Requirements described at 40 CFR §§ 257.3-1(a), 257.3-3, and 257.3-4, governing waste handling, storage, and disposal, including retention of the waste, in general[19], and 257.3-5, relating to precautions necessary to ensure that cadmium is not taken up into

[17] If any hazardous wastes as defined by RCRA or the Montana Hazardous Waste Act are encountered or generated during implementation of the remedy, substantive provisions of the Montana Hazardous Waste Act, §§ 75-10-401 et seq., MCA, and its implementing regulations at ARM 17.54.101 et seq., would be applicable to the handling, management, treatment, storage, disposal, and transportation of such wastes. In addition, other laws, such as substantive provisions of the federal Toxic Substances Control Act, are applicable to materials governed by that statute encountered or wastes governed by that statute generated during the remedial action. All off site handling of regulated RCRA or TSCA wastes must comply with all legal requirements, including the requirements of those laws.

[18] Federal and State solid waste requirements may also be relevant and appropriate for contaminated soils in certain circumstances. Generally, if soils materials are determined by the agencies to be able to be used in conjunction with other removal or remedial measures such as deep plowing, topsoil, or capping, these requirements are not considered relevant and appropriate, and such soils may remain in the floodplain.

[19] Solid waste regulations are promulgated pursuant to the federal Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901 et seq. They are applicable regulations, although the State of Montana has the lead role in regulating solid waste disposal in the State of Montana.

crops, including pasture grasses that may enter the food chain, at levels which may be a risk to human health.

2. For any discrete waste units containing sediments which are created or retained and actively managed by the MRSOU cleanup, reclamation and closure regulations found at 30 CFR Parts 816 and 784, governing coal and to a lesser extent, non-coal mining, are relevant and appropriate requirements[20].

3. Portions of RCRA regulations found at 40 CFR §§ 264.116 and .119(a) and (b) (governing notice and deed restrictions) are relevant and appropriate requirements for the waste management units created or actively managed at the MRSOU[21].

B. Air Standards—Clean Air Act (Applicable)

These standards, promulgated pursuant to section 109 of the Clean Air Act[22], are applicable to releases into the air from any MRSOU cleanup activities.

1. Lead: No person shall cause or contribute to concentrations of lead in the ambient air which exceed 1.5 micrograms per cubic meter (ug/m^3) of air, measured over a 90-day average. These standards are promulgated at ARM 17.8.222 as part of a federally approved State Implementation Plan (SIP), pursuant to the Clean Air Act of Montana, § 75-2-101 et seq., MCA. Corresponding federal regulations are found at 40 CFR § 50.12[23].

2. Particulate matter that is 10 microns in diameter or smaller (PM-10): No person shall cause or contribute to concentrations of PM-10 in the ambient air which exceed:

[20] The Surface Mining Control and Reclamation Act is promulgated at 30 U.S.C. §§ 1201 - 1326.

[21] As noted earlier, federal RCRA regulations are incorporated by reference into applicable State Hazardous Waste Management Act regulations. See ARM 17.53.801. Use of select RCRA regulations for mining waste cleanups is appropriate when discrete units are addressed by a cleanup and site conditions are distinguishable from EPA generic determination of low toxicity/high volume status for mining waste. See Preamble to the Final NCP, 55 Fed.Reg. 8763 - 8764 (March 8, 1990), CERCLA Compliance with Other Laws Manual, Volume II (August 1989 OSWER Directive #9234.1-02) p. 6-4; Preamble to the Proposed NCP, 53 Fed.Reg. 51447 (Dec. 21, 1988); and guidance entitled Consideration of RCRA Requirements in Performing CERCLA Responses at Mining Wastes Sites, August 19, 1986 (OSWER).

[22] 42 U.S.C. §§ 7401 et seq.

[23] Ambient air standards established as part of Montana's approved State Implementation Plan in many cases provide more stringent or additional standards. The federal standards by themselves apply only to major sources, while the State standards are fully applicable throughout the state and are not limited to major sources. See ARM 17.8.205 and 17.8.212-223. As part of an EPA approved State Implementation Plan, the state standards are also federally enforceable. Thus, the state standards which are equivalent to the federal standards are identified in this section. A more detailed list of State standards, which include standards which are not duplicated in federal regulations, is contained in the State ARAR identification section.

- 150 ug/m^3 of air, 24 hour average, no more than one expected exceedance per calendar year;
- 50 ug/m^3 of air, annual average.

These regulations are promulgated at ARM 17.8.223 as part of a federally approved SIP, pursuant to the Clean Air Act of Montana, §§ 75-2-101 et seq., MCA. Corresponding federal regulations are found at 40 CFR § 50.6.

Ambient air standards under section 109 of the Clean Air Act are also promulgated for carbon monoxide, hydrogen sulfide, nitrogen dioxide, sulfur dioxide, and ozone. If emissions of these compounds were to occur at the site in connection with any cleanup action, these standards would also be applicable. See ARM 17.8.222 and .223, and 40 CFR Part 50.

C. Point Source Controls—Clean Water Act (Applicable)

If point sources of water contamination are retained or created by any MRSOU remediation activity, applicable Clean Water Act standards would apply to those discharges. The regulations are discussed in the contaminant specific ARAR section, above, and in the State of Montana identification of ARARs. These regulations would include storm water runoff regulations found at 40 CFR Parts 121, 122, and 125 (general conditions and industrial activity conditions). These would also include requirements for best management practices and monitoring found at 40 CFR §§ 122.44(i) and 440.148, for point source discharges.

D. Dredge and Fill Requirements (Applicable)

Regulations found at 40 CFR Part 230 address conditions of or prohibitions against depositing dredge and fill material into water of the United States. If remediation activities would result in an activity subject to these regulations, they would be applicable. The scope of these regulations has been altered significantly in a 1998 court decision and regulatory responses found at 66 Fed.Reg. 4549 (January 17, 2001 - effective date temporarily suspended pending further review, 66 FR 10367 [February 15, 2001]). Compliance with this requirement will be achieved at the site of dredge and fill activity within the MRSOU during construction activities through the use of best management practices.

E. Underground Injection Control (Applicable)

Requirements found at 40 CFR Part 144, promulgated pursuant to the Safe Drinking Water Act, allow the re-injection of treated groundwater into the same formation from which it was withdrawn for aquifers such as the aquifer at the MRSOU, and addresses injection well construction, operation, maintenance, and capping/closure. These regulations would be applicable to any reinjection of treated groundwater.

F. Transportation of Hazardous or Contaminated Waste (Relevant and Appropriate)

40 CFR Part 263 establishes regulations for the transportation of hazardous waste. These regulations would govern any on-site transportation of contaminated material. Any off-site transportation would be fully subject to applicable regulations and permitting.

G. Federal Energy and Regulatory Commission Requirements, and Corresponding State of Montana Department of Natural Resources Requirements Regarding Dam Stability, Safety, and Maintenance

Currently, the Milltown Dam is regulated by the Federal Energy Regulatory Commission, which requires dams which fall within its authority to obtain permits and meet certain safety, stability, and maintenance standards. Because the Milltown Dam is operated by NorthWestern Corporation under a separate and long running permit, EPA will defer to FERC authority on these specific issues while the dam remains in place. If FERC authority ceases and is subsequently transferred to a corresponding State program administered by the State of Montana Department of Natural Resources and Conservation, EPA would defer to this authority as well. That authority is described in section III.G. of the State ARAR identification below.

However, if for any reason neither FERC nor the State DNRC regulates or enforces the appropriate standards, the following standards would become important relevant and appropriate Superfund requirements, imposed on the Superfund responsible parties. EPA notes that FERC recently classified the dam as a high hazard dam, and EPA would apply safety, stability, and maintenance.

16 U.S.C. Section 797, 799, and 803(a) and accompanying regulations which require dam stability and maintenance, especially regulations found at 18 CFR Part 12.

Northwestern will also seek to surrender the license for the Milltown Dam. EPA believes that all remediation decisions and actions, including restoration activities done in lieu of certain remedial actions, are not subject to federal or state permitting actions, pursuant to section 121(e)(1) of CERCLA, 42 U.S.C. § 9621(e)(1). EPA also believes that the combined remediation and restoration plans meet all substantive requirements for FERC license surrender. The surrender application will present the combined remediation and restoration plans to FERC, so that FERC may end its regulation of the Milltown Dam in an orderly way.

State of Montana ARARS

As provided by Section 121 of CERCLA, 42 U.S.C. § 9621, only those state standards that are more stringent than any federal standard and that have been identified by the state in a timely manner are appropriately included as ARARs.

I. Montana Contaminant Specific Requirements

A. Water Quality

1. Surface Water Quality Standards—Ambient and Point Source—Montana Water Quality Act (Applicable)

Under the Montana Water Quality Act, §§ 75-5-101 et seq., MCA, the state has promulgated water quality standards to protect, maintain, and improve the quality and potability of the state's surface water for water supplies, wildlife, fish and aquatic life, agricultural, industry, recreation, and other beneficial uses. Except as waived during construction activities by EPA as described in Section I.C. above, and except as explained below concerning the in-stream standards, the requirements listed below are applicable water quality standards with which any remedial action must comply. These requirements must be met upon completion of the remedial action (although operation and maintenance may continue after compliance).

ARM 17.30.607 (1)(a)-(n) (Applicable) classifies the waters of the MRSOU as follows:

Clark Fork River from Little Blackfoot River to Milltown Reservoir	B-1
Clark Fork River downstream of the Milltown Reservoir	B-1
Blackfoot River	B-1

The B-1 classification standards are contained in ARM 17.30.623 (Applicable) of the Montana water quality regulations. This section states:

Waters classified B-1 are suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply.

The B-1 classification standards at ARM 17.30.623 include the following criteria: 1) dissolved oxygen concentration must not be reduced below the levels given in department circular WQB-7; 2) the maximum allowable increase above naturally occurring turbidity is 5 nephelometric turbidity units; 3) temperature increases must be kept within prescribed limits; 4) no increases above naturally occurring concentrations of sediment or suspended sediment, settleable solids, oils, floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife are allowed; 5) true color must be kept within specified limits; and 6) induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 8.5 must be less than 0.5 pH unit. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0.

ARM 17.30.623 (applicable) also provides that concentrations of carcinogenic, bioconcentrating, toxic, or harmful parameters which would remain in the water after conventional water treatment may not exceed the applicable standards set forth in the current version of circular WQB-7. Discharges shall conform with ARM Title 16, Chapter 20, subchapter 7 (the nondegradation rules) and may not cause receiving water concentrations to exceed the applicable standards specified in WQB-7 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

If these standards are violated due to hazardous substances or Superfund response action, they must be complied with as part of any selected remedial action.

For the primary contaminants of concern, the WQB-7 levels are listed below. WQB-7 provides that "whenever both Aquatic Life Standards and Human Health Standards exist for the same analyte, the more restrictive of these values will be used as the numeric Surface Water Quality Standard."

Chemical	WQB-7 Standard (total recoverable standards)	
Arsenic	Acute	340 µg/l
	Chronic	150 µg/l
	Human Health	18 µg/l
Cadmium	Acute	2.1 µg/l @ 100 mg/l hardness
	Chronic	0.27 µg/l @ 100 mg/l hardness
Copper	Acute	18 µg/l @ 100 mg/l hardness
	Chronic	12 µg/l @ 100 mg/l hardness
	Human Health	1300 µg/l
Lead	Acute	82 µg/l @ 100 mg/l hardness
	Chronic	3.2 µg/l @ 100 mg/l hardness
	Human Health	15 µg/l
Zinc	Acute	119 µg/l @ 100 mg/l hardness
	Chronic	119 µg/l @ 100 mg/l hardness
	Human Health	2,000 µg/l

Except as temporarily waived by EPA for construction activities as described in the ROD and Section I.C. above, and except for exceedances resulting from upstream sources as described below, these standards will be applied to all contaminants of concern identified in the MRSOU ROD, both to point sources affected or created by the MRSOU cleanup and to ambient water in the MRSOU.

The Clark Fork River upstream of the MRSOU is being addressed under the Clark Fork River operable unit ROD. The in-stream standards identified for the CFROU are identical to the standards identified above, except that the CFROU ROD included a waiver of the State WQB-7 copper standard. The CFROU substitute standard for copper, based on the Federal

Water Quality Criteria and measured only on the dissolved portion of the sample, is as follows:

Copper	Acute	13 µg/l
	Chronic	9 µg/l
	Human Health	1,300 µg/l

Consequently, the surface water coming into the MRSOU may not meet the WQB-7 standard for copper.

The Milltown remedy is to address the contaminant loading from the MRSOU in a manner that prevents this OU from contributing directly to exceedances of the water quality standards. Thus, the number of exceedances of the WQB-7 standards at the MRSOU is expected to be similar to the number seen directly upstream of the operable unit. If contamination in the MRSOU were to cause exceedances of the CFROU standards or otherwise caused in-stream levels to worsen as the water passed through the OU, the MRSOU remedy may require that that contaminant loading be addressed.

Section 75-5-308, MCA, allows DEQ to grant short-term exemptions from the water quality standards or short-term use that exceeds the water quality standards for the purpose of allowing certain emergency remediation activities. Such exemptions typically extend for a period of 30-60 days. However, any exemption must include conditions that minimize to the extent possible the magnitude of the violation and the length of time the violation occurs. In addition, the conditions must maximize the protection of state waters by ensuring the maintenance of beneficial uses immediately after termination of the exemption. Water quality and quantity monitoring and reporting may also be included as conditions. Also, pursuant to 75-5-318, MCA, of the State Clean Water Act, an exemption from surface water quality standards may be authorized by the department under certain conditions, and this may apply to construction and dredging activities associated with sediment removal options. EPA has waived standards during construction and substituted temporary standards, using its CERCLA waiver authority. This application of the CERCLA waiver is consistent with the conditions specified in these sections.

Additional restrictions on any discharge to surface waters are included in:

- ARM 17.30.637 (Applicable) which prohibits discharges containing substances that will: (a) settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines; (b) create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials; (c) produce odors, colors or other conditions which create a nuisance or render undesirable tastes to fish flesh or make fish inedible; (d) create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; (e) create conditions which produce undesirable aquatic life.

- ARM 17.30.637 also states that no waste may be discharged and no activities conducted which, either along or in combination with other waste activities, will cause violation of surface water quality standards.

2. Montana Pollutant Discharge Elimination System (MPDES)—Stormwater and Other Point Sources (Applicable)

ARM 17.30.1203 (Applicable), adopts and incorporates the provisions of 40 CFR Part 125 for criteria and standards for the imposition of technology-based treatment requirements in MPDES permits. Although the permit requirement would not apply to on-site discharges, the substantive requirements of Part 125 are applicable, i.e., for toxic and nonconventional pollutants treatment must apply the best available technology economically achievable (BAT); for conventional pollutants, application of the best conventional pollutant control technology (BCT) is required. Where effluent limitations are not specified for the particular industry or industrial category at issue, BCT/BAT technology based treatment requirements are determined on a case by case basis using best professional judgment (BPJ). See CERCLA Compliance with Other Laws Manual, Vol. I, August 1988, p. 3-4 and 3-7. These State standards would apply to point source discharges created within the MRSOU. This requirement does not change the waiver of WQB-7 standards during construction and the substitution of temporary standards.

Under ARM 17.30.601, ARM 17.30.1101 et seq., and ARM 17.30.1301 et seq., the Montana Department of Environmental Quality has issued general stormwater permits for certain activities. The substantive requirements of the following permits are applicable for the following activities:

- For construction activities: General Permit for Storm Water Discharges Associated with Construction Activity, Permit No. MTR 100000 (June 8, 2002);
- For mining activities: General Permit for Storm Water Discharges Associated with Mining and with Oil and Gas Activities, Permit No. MTR300000 (November 17, 2002)[24];
- For industrial activities: General Permit for Storm Water Discharges Associated with Industrial Activity, Permit No. MTR000000 (October 1, 2001).

Generally, the permits listed above require the permittee to implement Best Management Practices (BMP) and to take all reasonable steps to minimize or prevent any discharge which has a reasonable likelihood of adversely affecting human health or the environment.[25] However, if there is evidence indicating potential or realized impacts on water quality due to any storm water discharge associated with the activity, the substantive standards associated with an individual MPDES permit or alternative general permit may be required.

A related mine reclamation requirement is set out in ARM 17.24.633 (relevant and appropriate), which requires that all surface drainage from disturbed areas that have been graded, seeded or planted must be treated by the best technology currently available (BTCA) before discharge. Sediment control through BTCA practices must be maintained until the disturbed area has been reclaimed, the revegetation requirements have been met, and the area meets state and federal requirements for the receiving stream.

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[24] This permit covers point source discharges of storm water from mining and milling activities (including active, inactive, and abandoned mine and mill sites) including activities with Standard Industrial Code 14 (metal mining).

[25] For further explanation of storm water applications, see the letter from EPA to Chuck Stilwell, ARCO, dated February 2, 1999, which describes that treatment, in addition to BMPs, may be necessary if in-stream standards are not met after implementation of BMPs.

3. Groundwater Standards (Applicable)

ARM 17.30.1006 (Applicable) classifies groundwater into Classes I through IV based upon its specific conductance and establishes the groundwater quality standards applicable with respect to each groundwater classification.

Based upon its specific conductance, the majority of the groundwater in the MRSOU is considered Class I groundwater, with the remainder of the groundwater Class II[26].

Concentrations of dissolved substances in Class I or II groundwater (or Class III groundwater which is used as a drinking water source) may not exceed the human health standards listed in department Circular WQB-7. For the primary contaminants of concern these levels are listed below. Ground water is measured in dissolved form, according to WQB-7.

Chemical	WQB-7 Human Health Standard (January 2004 edition)	
Arsenic	20	ug/1
Cadmium	5	ug/1
Copper	1300	ug/1
Lead	15	ug/1
Zinc	**2000**	**ug/1**

Zinc is not addressed under federal groundwater standards. Therefore, the State zinc standard is a Performance Standard for the MRSOU ROD. Other state standards listed above are not as stringent or are duplicative of federal standards previously identified as Performance Standards.

For concentrations of parameters for which human health standards are not listed in WQB-7, ARM 17.30.1006 allows no increase of a parameter to a level that renders the waters harmful, detrimental or injurious to listed beneficial uses.

For Class I and II groundwaters, ARM 17.30.1006 allows no increase of a parameter that causes a violation of the nondegradation provisions of § 75-5-303, MCA. ARM 17.30.1011 also provides that groundwater whose existing quality is higher than the standard for its classification must be maintained at that high quality unless degradation may be allowed under the principles established in § 75-5-303, MCA, and the nondegradation rules at ARM 17.30.701 et seq.

An additional concern with respect to ARARs for groundwater is the impact of groundwater upon the surface water. If significant loadings of contaminants from groundwater sources to the Clark Fork River contribute to the inability of the stream to meet its water quality standards, then alternatives to alleviate such groundwater loading must be evaluated and, if appropriate, implemented. Groundwater in certain areas may need to be

[26] ARM 17.30.1006 provides that Class I groundwaters are those with specific conductance of less than 1000 microSiemens per centimeter at 25B C; Class II groundwaters: 1000 to 2500; Class III groundwaters: 2500 to 15,000; and Class IV groundwaters: over 15,000.

remediated to levels more stringent than the groundwater classification standards in order to achieve the standards for affected surface water. See Compliance with Federal Water Quality Criteria, OSWER Publication 9234.2-09/FS (June 1990) ("Where the ground water flows naturally into the surface water, the ground-water remediation should be designed so that the receiving surface-water body will be able to meet any ambient water-quality standards (such as State WQSs or FWQC) that may be ARARs for the surface water.").

B. Air Quality

In addition to the standards identified in the federal action specific ARARs above, the State of Montana has identified certain air quality standards in the action-specific section of the State ARARs below.

II. Montana Location Specific Requirements

A. Floodplain and Floodway Management Act, Sections 76-5-401 et seq., and Implementing Regulations (Applicable)

The Floodplain and Floodway Management Act and regulations specify types of uses and structures that are allowed or prohibited in the designated 100-year floodway[27] and floodplain[28]. Since the MRSOU lies almost entirely within the 100-year floodplain of the Clark Fork River, these standards are applicable to all actions contemplated for this site within the floodplain.

1. Allowed Uses: The law recognizes certain uses as allowable in the floodway and a broader range of uses as allowed in the floodplain. Residential use is among the possible allowed uses expressly recognized in both the floodway and floodplain. "Residential uses such as lawns, gardens, parking areas, and play areas," as well as certain agricultural, industrial-commercial, recreational and other uses are permissible within the designated floodway, provided they do not require structures other than portable structures, fill or permanent storage of materials or equipment. 76-5-401, MCA; ARM 36.15.601. In addition, in the flood fringe (i. e., within the floodplain but outside the floodway), residential, commercial, industrial, and other structures may be permitted subject to certain conditions relating to placement of fill, roads, floodproofing, etc. § 76-5-402, MCA; ARM 36.15.701. Domestic water supply wells may be permitted, even within the floodway, provided the well casing is watertight to a depth of 25 feet and the well meets certain conditions for floodproofing, sealing, and positive drainage away from the well head. ARM 36.15.602(6).

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[27] The floodway is the channel of a watercourse or drainway and those portions of the floodplain adjoining the channel which are reasonably required to carry and discharge the floodwater of the water course or drainway. ARM 36.15.101(13).

[28] The floodplain is the area adjoining the water course or drainway which would be covered by the floodwater of a base (100-year) flood except for sheet flood areas that receive less than one foot of water per occurrence. The floodplain consists of the floodway and flood fringe. ARM 36.15.101.

2. Prohibited Uses: Uses prohibited anywhere in either the floodway or the floodplain are:

   a. solid and hazardous waste disposal; and
   b. storage of toxic, flammable, hazardous, or explosive materials.

ARM 36.15.605(2) and 36.15.703.

In the floodway, additional prohibitions apply, including prohibition of:

   a. a building for living purposes or place of assembly or permanent use by human beings;

   b. any structure or excavation that will cause water to be diverted from the established floodway,[29] cause erosion, obstruct the natural flow of water, or reduce the carrying capacity of the floodway; and

   c. the construction or permanent storage of an object subject to flotation or movement during flood level periods.

Section 76-5-403, MCA.

1. Applicable Considerations in Use of Floodplain or Floodway

Applicable regulations also specify factors that must be considered in allowing diversions of the stream, changes in place of diversion of the stream, flood control works, new construction or alteration of artificial obstructions, or any other nonconforming use within the floodplain or floodway. Many of these requirements are set forth as factors that must be considered in determining whether a permit can be issued for certain obstructions or uses. While permit requirements are not directly applicable to remedial actions conducted entirely on site, the substantive criteria used to determine whether a proposed obstruction or use is permissible within the floodway or floodplain are applicable standards. Factors which must be considered in addressing any obstruction or use within the floodway or floodplain include:

1. the danger to life and property from backwater or diverted flow caused by the obstruction or use;

2. the danger that the obstruction or use will be swept downstream to the injury of others;

3. the availability of alternate locations;

[29] Use of a diversion channel to control sediment scour and erosion as part of the remedy will cause water to be diverted from the established floodway. However, § 76-5-405 allows variances for an obstruction or nonconforming use in certain instances. EPA and DEQ have determined that the proposed diversion channel fully satisfies the criteria for such a variance under § 76-5-406. The diversion will be temporary and will best serve the purposes of the floodplain protection requirements. Moreover, ARM 36.15.603 specifies certain criteria which are to be met in approving a change in place of water diversion in a floodway. The use of the diversion channel for this project is consistent with those criteria as well. That regulation also specifies that any diversion structure crossing the full width of the stream channel must be designed and constructed to safely withstand up to a base (100-year) flood.

4. the construction or alteration of the obstruction or use in such a manner as to lessen the danger;

5. the permanence of the obstruction or use; and

6. the anticipated development in the foreseeable future of the area which may be affected by the obstruction or use.

See 76-5-406, MCA; ARM 36.15.216 (substantive provisions only).

Conditions or restrictions that generally apply to specific activities within the floodway or floodplain are:

1. the proposed activity, construction, or use cannot increase the upstream elevation of the 100-year flood a significant amount (one-half foot or as otherwise determined by the permit issuing authority) or significantly increase flood velocities, ARM 36.15.604 (Applicable, substantive provisions only); and

2. the proposed activity, construction, or use must be designed and constructed to minimize potential erosion from a base (100-year) flood, see ARM 36.15.603.

For the substantive conditions and restrictions applicable to specific obstructions or uses, see the following applicable regulations:

Excavation of material from pits or pools- ARM 36.15.602 (1).
Water diversions or changes in place of diversion- ARM 36.15.603.
Flood control works - ARM 36.15.606.
Roads, streets, highways and rail lines (must be designed to minimize increases in flood heights) - ARM 36.15.701(3) (c).
Structures and facilities for liquid or solid waste treatment and disposal (must be floodproofed to ensure that no pollutants enter flood waters and may be allowed and approved only in accordance with DEQ regulations, which include certain additional prohibitions on such disposal) - ARM 36.15.701(3) (d).
Residential structures - ARM 36.15.702(1).
Commercial or industrial structures - ARM 36.15.702(2).

B. Solid Waste Management Regulations (Applicable)

Regulations promulgated under the Solid Waste Management Act, §§ 75-10-201 et seq., MCA, specify requirements that apply to the location of any solid waste management facility. At the MRSOU, that includes existing sediment disposal areas, newly created debris disposal areas, and the area where wastes will be left in place. Under ARM 17.50.505, a facility for the treatment, storage or disposal of solid wastes:

(a) must be located where a sufficient acreage of suitable land is available for solid waste management;
(b) may not be located in a 100-year floodplain;
(c) may be located only in areas which will prevent the pollution of ground and surface waters and public and private water supply systems;
(d) must be located to allow for reclamation and reuse of the land;

(e) drainage structures must be installed where necessary to prevent surface runoff from entering waste management areas; and

(f) where underlying geological formations contain rock fractures or fissures which may lead to pollution of the ground water or areas in which springs exist that are hydraulically connected to a proposed disposal facility, only Class III disposal facilities may be approved[30].

Even Class III landfills may not be located on the banks of or in a live or intermittent stream or water saturated areas, such as marshes or deep gravel pits which contain exposed ground water. ARM 17.54.505(2)(j).

In addition, § 75-10-212 prohibits dumping or leaving any debris or refuse upon or within 200 yards of any highway, road, street, or alley of the State or other public property, or on privately owned property where hunting, fishing, or other recreation is permitted. However, the restriction relating to privately owned property does not apply to the owner, his agents, or those disposing of debris or refuse with the owner's consent.

C. Natural Streambed and Land Preservation Standards (Applicable)

Sections 87-5-502 and 504, MCA, (substantive provisions only) provide that a state agency or subdivision shall not construct, modify, operate, maintain or fail to maintain any construction project or hydraulic project which may or will obstruct, damage, diminish, destroy, change, modify, or the natural existing shape and form of any stream or its banks or tributaries in a manner that will adversely affect any fish or game habitat. The requirement that any such project must eliminate or diminish any adverse effect on fish or game habitat is applicable to the state in concurring upon any remedial actions to be conducted. The Natural Streambed and Land Preservation Act of 1975, §§ 75-7-101 et seq., MCA, includes substantive requirements and is applicable to private parties as well as government agencies.

While the administrative/ procedural requirements including the consent and approval requirement set forth in these statutes and regulations are not ARARs, the party designing and implementing the remedial action for the MRSOU should continue to consult with the Montana Department of Fish, Wildlife and Parks and any conservation district or board of county commissioners (or consolidated city/county government) as provided in the referenced statutes, to assist in the evaluation of factors discussed above.

ARM 36.2.410 establishes minimum standards which would be applicable if a remedial action alters or affects a streambed, including any channel change. Projects must be

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[30] Group III consists of primarily inert wastes, including industrial mineral wastes which are essentially inert and non-water soluble and do not contain hazardous waste constituents. ARM 17.50.503(1)(b).

designed and constructed using methods that minimize adverse impacts to the stream (both upstream and downstream) and future disturbances to the stream. All disturbed areas must be managed during construction and reclaimed after construction to minimize erosion. Temporary structures used during construction must be designed to handle high flows reasonably anticipated during the construction period. Temporary structures must be completely removed from the stream channel at the conclusion of construction and the area must be restored to a natural or stable condition. Channel alternation must be designed to retain original stream length or otherwise provide hydrologic stability. Streambank vegetation must be protected except where removal of such vegetation is necessary for the completion of the project. When removal of vegetation is necessary, it must be kept to a minimum. Riprap, rock, and other material used in a project must be of adequate size, shape and density and must be properly placed to protect the streambank from erosion. The placement of road fill material in a stream, the placement of debris or other materials in a stream where it can erode or float into the stream, projects that permanently prevent fish migration, operation of construction equipment in a stream, and excavation of streambed gravels are prohibited unless specifically authorized. Such projects must also protect the use of water for any useful or beneficial purpose. See 75-7-102, MCA.

III. Montana Action Specific Requirements

A. Water Quality Statute and Regulations (Applicable)

Causing of pollution: Section 75-5-605 of the Montana Water Quality Act prohibits the causing of pollution of any state waters. Pollution is defined as contamination or other alteration of physical, chemical, or biological properties of state waters which exceeds that permitted by the water quality standards. The temporary waiver of certain water quality standards and their replacement with temporary standards, as described above, also applies to this requirement. Best Management Practices described in the ROD and further developed during remedial design and restoration design are intended to meet this requirement.

Placement of Wastes: Section 75-5-605, MCA, states that it is unlawful to place or cause to be placed any wastes where they will cause pollution of any state waters. Placement of waste is not prohibited if the authorization for placement contains provisions for review of the placement of materials to ensure it will not cause pollution to state waters.

Nondegradation: Section 75-5-303, MCA, states that existing uses of state waters and the level of water quality necessary to protect the uses must be maintained and protected. Section 75-5-317, MCA, and ARM 17.30.708 provide an exemption from nondegradation requirements which allows changes of existing water quality resulting from an emergency or remedial activity that is designed to protect the public health or the environment and that is approved, authorized, or required by the department. Changes determined to meet these requirements may be considered nonsignificant. In determining that remedial actions are protective of public health and the environment and in approving, authorizing, or requiring such remedial activities, no significant degradation should be approved, considering the criteria for a determination of non-significance set out in 75-5-301(5)(c), which (i) equate significance with the potential for harm to human health, a beneficial use or the environment, (ii) consider both the quantity and strength of the pollutant, (iii) consider the length of time the degradation will occur, and (iv) consider the character of the pollutant so that greater significance is associated with carcinogens and toxins that bioaccumulate or biomagnify and lesser significance is associated with substances that are less harmful or less persistent. Under ARM 17.30.715(1)(b), concentrations of carcinogenic parameters or parameters with a bioconcentration factor greater than 300 cannot exceed the concentration in the receiving water in order for a discharge to be considered nonsignificant and thus exempt from nondegradation requirements under § 75-5-317.

ARM 17.30.705 provides that for all state waters, existing and anticipated uses and the water quality necessary to protect these uses must be maintained and protected.

ARM 17.30.1011 provides that any groundwater whose existing quality is higher than the standard for its classification must be maintained at that high quality unless degradation may be allowed under the principles established in § 75-5-303, MCA, and the nondegradation rules at ARM 17.30.701 et seq.

B. Montana Pollutant Discharge Elimination System (MPDES)—Stormwater and Other Point Sources (Applicable or Relevant and Appropriate)

ARM 17.30.1342 - .1344 set forth the substantive requirements applicable to all MPDES permits. The substantive requirements, including the requirement to properly operate and maintain all facilities and systems of treatment and control are applicable requirements.

Under ARM 17.30.601, ARM 17.30.1101 et seq., and ARM 17.30.1301 et seq., the Montana Department of Environmental Quality has issued general stormwater permits for certain activities. The substantive requirements of the following permits are applicable for the following activities:

- For construction activities: General Permit for Storm Water Discharges Associated with Construction Activity, Permit No. MTR 100000 (June 8, 2002);
- For mining activities: General Permit for Storm Water Discharges Associated with Mining and with Oil and Gas Activities, Permit No. MTR300000 (November 17, 2002)[31];
- For industrial activities: General Permit for Storm Water Discharges Associated with Industrial Activity, Permit No. MTR000000 (October 1, 2001).

Generally, the permits listed above require the permittee to implement Best Management Practices (BMP) and to take all reasonable steps to minimize or prevent any discharge which has a reasonable likelihood of adversely affecting human health or the environment.[32] However, if there is evidence indicating potential or realized impacts on water quality due

[31] This permit covers point source discharges of storm water from mining and milling activities (including active, inactive, and abandoned mine and mill sites) including activities with Standard Industrial Code 14 (metal mining).

[32] For further explanation of storm water applications, see the letter from EPA to Chuck Stilwell, ARCO, dated February 2, 1999, which describes that treatment, in addition to BMPs, may be necessary if in-stream standards are not met after implementation of BMPs. This letter was issued under the Butte Priority Soils operable unit, but similar reasoning applies to this site.

to any storm water discharge associated with the activity, the substantive standards associated with an individual MPDES permit or alternative general permit may be required.

A related mine reclamation requirement is set out in ARM 17.24.633 (relevant and appropriate), which requires that all surface drainage from disturbed areas that have been graded, seeded or planted must be treated by the best technology currently available (BTCA) before discharge. Sediment control through BTCA practices must be maintained until the disturbed area has been reclaimed, the revegetation requirements have been met, and the area meets state and federal requirements for the receiving stream.

C. Air Quality

1. Air Quality Regulations (Applicable)

Dust suppression and control of certain substances likely to be released into the air as a result of earth moving, transportation and similar actions related to remedial activity at the MRSOU may be necessary to meet air quality requirements. Certain ambient air standards for specific contaminants and particulates are set forth in the federal action specific section above. Additional air quality regulations under the state Clean Air Act, §§ 75-2-101 et seq., MCA, are discussed below.

ARM 17.8.604 (Applicable) lists certain wastes that may not be disposed of by open burning, including oil or petroleum products, RCRA hazardous wastes, chemicals, and treated lumber and timbers. Any waste which is moved from the premises where it was generated and any trade waste (material resulting from construction or operation of any business, trade, industry or demolition project) may be open burned only in accordance with the substantive requirements of ARM 17.8.611 or 612.

ARM 17.8.308 (Applicable) provide that no person shall cause or authorize the production, handling, transportation or storage of any material, cause or authorize the use of any street, road, or parking lot, or operate a construction site or demolition project, unless reasonable precautions to control emissions of airborne particulate matter are taken. Normally, emissions of airborne particulate matter must be controlled so that they do not "exhibit an opacity of twenty percent (20%) or greater averaged over six consecutive minutes." See also ARM 17.8.304 (Applicable).

In addition, state law provides an ambient air quality standard for settled particulate matter. Particulate matter concentrations in the ambient air shall not exceed the following 30-day average: 10 grams per square meter. ARM 17.8.220 (Applicable). Whenever this standard is exceeded, the activity resulting in such exceedance shall be suspended until such time as conditions improve.

ARM 17.24.761 (Relevant and Appropriate) specifies a range of measures for controlling fugitive dust emissions during mining and reclamation activities. Some of these measures could be considered relevant and appropriate to control fugitive dust emissions in connection with excavation, earth moving and transportation activities conducted as part of the remedy at the site. Such measures include, for example, paving, watering, chemically stabilizing, or frequently compacting and scraping roads, promptly removing rock, soil or other dust-forming debris from roads, restricting vehicle speeds, revegetating, mulching, or otherwise stabilizing the surface of areas adjoining roads, restricting unauthorized- vehicle travel, minimizing the area of disturbed land, and promptly revegetating regraded lands.

D. Solid Waste Management Regulations (Applicable)

As noted above, the Solid Waste Management Regulations are applicable to the disposal or active management of the tailings, construction debris, and similar wastes within the MRSOU. Certain of these regulations are identified in the state location specific ARARs above. Action specific solid waste regulations are discussed below:

ARM 17.50.505(2) specifies standards for solid waste management facilities, including the requirements that:

1. Class II[33] landfills must confine solid waste and leachate to the disposal facility. If there is the potential for leachate[34] migration, it must be demonstrated that leachate will only migrate to underlying formations which have no hydraulic continuity with any state waters;
2. adequate separation of group II wastes from underlying or adjacent water must be provided[35]; and
3. no new disposal units or lateral expansions may be located in wetlands.

ARM 17.50.506 specifies design requirements for landfills[36]. Landfills must either be designed to ensure that MCLs are not exceeded or the landfill must contain a composite liner and leachate collection system which comply with specified criteria.

ARM 17.50.511 sets forth general operational and maintenance and design requirements for solid waste management systems. Specific operational and maintenance requirements specified in ARM 17.50.511[37] that are relevant and appropriate are requirements for run-on and runoff control systems, requirements that sites be fenced to prevent unauthorized access, and prohibitions of point source and nonpoint source discharges which would violate Clean Water Act requirements.

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[33] Generally Class II landfills are licensed to receive Group II and Group III waste, but not regulated hazardous waste. Class III landfills may only receive Group III waste. Class IV landfills may receive Group III or IV waste.

[34] Leachate is defined as a liquid which has contacted passed through, or emerged from solid waste and contains soluble, suspended, or miscible materials removed from the waste. ARM 17.50.502(29).

[35] The extent of separation shall be established on a case-by-case basis, considering terrain and the type of underlying soil formations, and facility design. The Waste Management Section of DEQ has generally construed this to require a 10 to 20 foot separation from groundwater.

[36] A landfill is defined as an area of land or an excavation where wastes are placed for permanent disposal, and that is not a land application unit, surface impoundment, injection well, or waste pile. ARM 17.50.502(27).

[37] ARM 17.50.511(1)(j), 17.50.511(1)(k) and 17.50.511(1)(l)

ARM 17.50.523 specifies that solid waste must be transported in such a manner as to prevent its discharge, dumping, spilling or leaking from the transport vehicle.

ARM 17.50.530 sets forth the closure[38] requirements for landfills. Class II landfills must meet the following criteria:

1. install a cover that is designed to minimize infiltration and erosion.
2. design and construct the final cover system to minimize infiltration through the closed unit by the use of an infiltration layer that contains a minimum 18 inches of earthen material and has a permeability less than or equal to the permeability of any bottom liner, barrier layer, or natural subsoils or a permeability no greater than 1 X 10-5 cm/sec, whichever is less;
3. minimize erosion of the final cover by the use of a seed bed layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth and protecting the infiltration layer from frost effects and rooting damage; and
4. revegetate the final cover with native plant growth within one year of placement of the final cover.

ARM 17.50.530(1)(b) allows an alternative final cover design if the infiltration layer achieves reduction in infiltration at least equivalent to the stated criteria and the erosion layer provides protection equivalent to the stated criteria.

ARM 17.50.531 sets forth post closure care requirements for Class II landfills. Post closure care must be conducted for a period sufficient to protect human health and the environment. Post closure care requires maintenance of the integrity and effectiveness of any final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the cover and comply with the groundwater monitoring requirements found at ARM Title 17, chapter 50, subchapter 7.

Disposal of construction and demolition debris[39] is addressed in regulations for Class III or Class IV landfills. Requirements applicable to the design of Class IV landfills, including plans for construction quality control and construction quality assurance, are found in ARM 17.50.506. Specific operational requirements for Class III and IV facilities are found in ARM 17.50.511, and require, inter alia, that conditionally exempt small generator wastes must be removed to the greatest extent practicable and all liquid paints, solvents, glues, resins, dyes,

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[38] Closure means the process by which the operator closes all or part of the facility.

[39] ARM 17-50-503 provides, "Group III wastes include wood wastes and non-water soluble solids. These wastes are characterized by their general inert nature and low potential for adverse environmental impacts. Examples include, but are not limited to... inert solid waste such as unpainted brick, dirt, rock and concrete ... clean, untreated, unglued wood materials, brush, unpainted or untreated lumber, and vehicle tires; and ... industrial mineral wastes which are essentially inert and non-water soluble and do not contain hazardous waste constituents. ...Group IV wastes include construction and demolition wastes, and asphalt, except regulated hazardous wastes."

oils, pesticides, and other household hazardous waste must be removed from buildings prior to demolition.

Section 75-10-206, MCA, allows variances[40] to be granted from solid waste regulations if failure to comply with the rules does not result in a danger to public health or safety or compliance with specific rules would produce hardship without producing benefits to the health and safety of the public that outweigh the hardship. In certain circumstances relating to waste nature and volume and the provisions of the Superfund law regarding ongoing maintenance and review, certain of the Solid Waste regulations regarding design of landfills, operational and maintenance requirements, and landfill closure and post-closure care may appropriately be subject to variance for the MRSOU. For example, the barrier layer and leachate collection and removal system requirements of ARM 17.50.506 may be subject to variance as long as the design ensures that concentration values listed in Table 1, ARM 17.50.506, will not be exceeded in the uppermost aquifer, measured at the appropriate location. Similarly, the ground water monitoring requirements of ARM 17.50.701 et seq. can be considered and coordinated with any other monitoring requirements under CERCLA.

E. Reclamation Requirements

1. Noxious Weed Control Act, Section 7-22-2101 et seq., MCA, and ARM 4.5.201 et seq. (Applicable)

These requirements mandate careful weed control planning for identified noxious weeds in projects such as the Milltown revegetation project.

The Strip and Underground Mine Reclamation Act, §§ 82-4-201 through 254, MCA, technically applies to coal and uranium mining, but that statute and the regulations promulgated under that statue and discussed in this section set out the standards that mine reclamation should attain. Those requirements identified here have been determined to be relevant and appropriate requirements for this action. Section 82-4-231 (Relevant and Appropriate) requires the reclamation and revegetation of the land as rapidly, completely, and effectively as the most modern technology and the most advanced state of the art will allow. In developing a method of operation and plans of backfilling, water control, grading, topsoiling and reclamation, all measures shall be taken to eliminate damages to landowners and members of the public, their real and personal property, public roads, streams, and all other public property from soil erosion, subsidence, landslides, water pollution, and hazards dangerous to life and property. Sections 82-4-231(10)(j) and (10(k)(i) and ARM 17.24.751 (Relevant and Appropriate) provide that reclamation of mine waste materials shall, to the extent possible using the best technology currently available, minimize disturbances and adverse impacts of the operation on fish, wildlife, and related environmental values and achieve enhancement of such resources where practicable, and shall avoid acid or other toxic mine drainage by such measures as preventing or removing water from contact with toxic producing deposits. ARM 17.24.315 sets forth standards for ponds and embankments. Section 82-4-233, MCA, requires vegetation as is necessary to

40 See the letter from EPA to Chuck Stilwell, ARCO, dated May 21, 2002, which describes the application of variances to solid waste management rules for the Railroad Bed Time Critical Removal Action (TCRA) at the BPSOU.

establish a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the area of land to be affected and capable of self-regeneration and plant succession at least equal in extent of cover to the natural vegetation of the area except that introduced species may be used in the revegetation process where desirable and necessary to achieve the approved postmining land use plan. ARM 17.24.641 (Relevant and Appropriate) also provides that drainage from acid forming or toxic-forming spoil into ground and surface water must be avoided by preventing water from coming into contact with such spoil. ARM 17.24.505 (Relevant and Appropriate) similarly provides that acid, acid forming, toxic, toxic-forming or other deleterious materials must not be buried or stored in proximity to a drainage course so as to cause or pose a threat of water pollution.

Reclamation Activities - Hydrology Regulations (Relevant and Appropriate)

The hydrology regulations promulgated under the Strip and Underground Mine Reclamation Act, §§ 82-4-201 et seq., MCA, provide detailed guidelines for addressing the hydrologic impacts of mine reclamation activities and earth-moving projects and are relevant and appropriate for addressing these impacts in the MRSOU.

ARM 17.24.631 (Relevant and Appropriate) provides that long-term adverse changes in the hydrologic balance from mining and reclamation activities, such as changes in water quality and quantity, and location of surface water drainage channels shall be minimized. Water pollution must be minimized and, where necessary, treatment methods utilized. Diversions of drainage to avoid contamination must be used in preference to the use of water treatment facilities. Other pollution minimization devices must be used if appropriate, including stabilizing disturbed areas through land shaping, diverting runoff, planting quickly germinating and growing stands of temporary vegetation, regulating channel velocity of water, lining drainage channels with rock or vegetation, mulching, and control of acid-forming and toxic-forming waste materials.

ARM 17.24.633 (Relevant and Appropriate) provides water quality performance standards that may be invoked in the event that runoff from the treated areas threatens water quality or sediments in the stream, including the requirement that all surface drainage from a disturbed area must be treated by the best technology currently available (BTCA). Treatment must continue until the area is stabilized.

ARM 17.24.634 (Relevant and Appropriate) provides that, in reclamation of drainages, drainage design must emphasize channel and floodplain dimensions that approximate the pre-mining configuration and that will blend with the undisturbed drainage above and below the area to be reclaimed. The average stream gradient must be maintained with a concave longitudinal profile. This regulation provides specific requirements for designing the reclaimed drainage to:

1. approximate an appropriate geomorphic habit or characteristic pattern;
2. remain in dynamic equilibrium with the system without the use of artificial structural controls;
3. improve unstable premining conditions;
4. provide for floods and for long term stability of the landscape; and
5. establish a premining diversity of aquatic habitats and riparian vegetation.

ARM 17.24.635 through 26.4.637 (Relevant and Appropriate) set forth requirements for temporary and permanent diversions.

ARM 17.24.638 (Relevant and Appropriate) specifies sediment control measures to be implemented during operations.

ARM 17.24.639 (Relevant and Appropriate) sets forth requirements for temporary and permanent sedimentation ponds.

ARM 17.24.640 (Relevant and Appropriate) provides that discharge from sedimentation ponds, permanent and temporary impoundments, and diversions shall be controlled by energy dissipaters, riprap channels, and other devices, where necessary, to reduce erosion, prevent deepening or enlargement of stream channels, and to minimize disturbance of the hydrologic balance.

ARM 17.24.643 (Relevant and Appropriate) requires protection of groundwater resources.

ARM 17.24.645 (Relevant and Appropriate) sets forth requirements for groundwater monitoring.

ARM 17.24.646 (Relevant and Appropriate) sets forth requirements for surface water monitoring.

Reclamation and Revegetation Requirements (Relevant and Appropriate)

ARM 17.24.501 (Relevant and Appropriate) gives general backfilling and final grading requirements. Backfill must be placed so as to minimize sedimentation, erosion, and leaching of acid or toxic materials into waters, unless otherwise approved. Final grading must be to the approximate original contour of the land and final slopes must be graded to prevent slope failure, may not exceed the angle of repose, and must achieve a minimum long term static safety factor of 1:3. The disturbed areas must be blended with surrounding and undisturbed ground to provide a smooth transition in topography.

ARM 17.24.519 (Relevant and Appropriate) provides that an operator may be required to monitor settling of regraded areas.

ARM 17.24.702(4), (5), and (6) (Relevant and Appropriate) requires that during the redistributing and stockpiling of soil (for reclamation):

1. regraded areas must be deep-tilled, subsoiled, or otherwise treated to eliminate any possible slippage potential, to relieve compaction, and to promote root penetration and permeability of the underlying layer; this preparation must be done on the contour whenever possible and to a minimum depth of 12 inches;

2. redistribution must be done in a manner that achieves approximate uniform thicknesses consistent with soil resource availability and appropriate for the postmining vegetation., land uses, contours, and surface water drainage systems; and

3. redistributed soil must be reconditioned by subsoiling or other appropriate methods.

ARM 17.24.703 (Relevant and Appropriate) requires that when using materials other than, or along with, soil for final surfacing in reclamation, the operator must demonstrate that the material (1) is at least as capable as the soil of supporting the approved vegetation and subsequent land use, and (2) the medium must be the best available in the area to support vegetation. Such substitutes must be used in a manner consistent with the requirements for redistribution of soil in ARM 17.24.701 and 702.

ARM 17.24.711 (Relevant and Appropriate) requires that a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the area of land to be affected shall be established except on road surfaces and below the low-water line of permanent impoundments. See also § 82-4-233, MCA (Relevant and Appropriate). Vegetative cover is considered of the same seasonal variety if it consists of a mixture of species of equal or superior utility when compared with the natural vegetation during each season of the year (See also ARM 17.24.716 and .719 below regarding substitution of introduced species for native species). This requirement may not be appropriate where other cover is more suitable for the particular land use or another cover is requested by the landowner.

ARM 17.24.713 (Relevant and Appropriate) provides that seeding and planting of disturbed areas must be conducted during the first appropriate period for favorable planting after final seedbed preparation.

ARM 17.24.714 (Relevant and Appropriate) requires use of a mulch or cover crop or both until an adequate permanent cover can be established. Use of mulching and temporary cover may be suspended under certain conditions.

ARM 17.24.716 (Relevant and Appropriate) establishes the required method of revegetation, and provides that introduced species may be substituted for native species as part of an approved plan.

ARM 17.24.717 (Relevant and Appropriate) relates to the planting of trees and other woody species if necessary, as provided in § 82-4-233, MCA, to establish a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the affected area and capable of self-regeneration and plan succession at least equal to the natural vegetation of the area, except that introduced species may be used in the revegetation process where desirable and necessary to achieve the approved land use plan.

ARM 17.24.718 (Relevant and Appropriate) requires the use of soil amendments and other means such as irrigation, management, fencing, or other measures, if necessary to establish a diverse and permanent vegetative cover.

ARM 17.24.721 (Relevant and Appropriate) specifies that rills or gullies in reclaimed areas must be filled, graded or otherwise stabilized and the area reseeded or replanted if the rills and gullies are disrupting the reestablishment of the vegetative cover or causing or contributing to a violation of water quality standards for a receiving stream.

ARM 17.24.723 (Relevant and Appropriate) sets forth requirements for vegetation, soils, wildlife, and other monitoring.

ARM 17.24.724 (Relevant and Appropriate) specifies that revegetation success must be measured against approved unmined reference areas or by comparison with technical standards from historic data. More than one reference area or historic record must be established for vegetation types with significant variation due to a number of factors.

ARM 17.24.726 (Relevant and Appropriate) sets forth vegetation production, cover, diversity, density, and utility requirements.

ARM 17.24.733 (Relevant and Appropriate) sets forth standards for trees, shrubs, and half shrubs.

F. Montana Dam Safety Act and Implementing Regulations

In the absence of FERC nonpower use license, pursuant to 16 U.S.C. 808(b), or a FERC power use license, the structural safety and maintenance of dam and reservoir for a nonpower project is governed by the laws and regulations of the State in which the project is located. The dam is classified as a high hazard dam. The substantive and procedural requirements under the Dam Safety Act, § 85-15-101 et seq., MCA, and implementing regulations at ARM 36.14.101 et seq. would be implemented by the State should FERC authority and permitting not be done. The requirements would be independently applicable if the dam was no longer exempt under 85-15-107, MCA, as licensed and supervised under FERC authority. Below is a description of the State dam standards which are applicable and contain safety, stability, maintenance, and removal requirements. As noted, EPA would defer to independent State authority regarding these issues - the substantive provisions of these requirements would become ARARs only if the State did not implement or enforce these provisions.

Section 85-15- 207, MCA, states that no person may fill or procure to be filled with water any dam or reservoir that is not so thoroughly and substantially constructed as to safely hold any water that may be turned therein.

Section 85-15- 208, MCA, states that no person may construct or cause to be constructed a dam or reservoir for the purpose of accumulating, storing, appropriating, or diverting any of the waters of this state, except in a thorough, secure, and substantial manner.

ARM 36.14.501 sets forth high hazard dam criteria. An earthfill dam must be safe and stable during all phases of construction and operation of the reservoir. To accomplish this, the following criteria must be met: (a) the embankment must be safe against overtopping during occurrence of the inflow design flood by the provision of sufficient spillway and outlet works capacity; (b) the slopes of the embankment must be stable during construction and under all conditions of reservoir operation, including rapid drawdown of the reservoir; (c) the embankment must be designed so as not to impose excessive stresses upon the foundation; (d) seepage flow through the embankment, foundation, and abutments must be controlled so that no internal erosion or piping takes place and so there is no sloughing in the area where the seepage emerges; (e) the embankment must be safe against overtopping by wave action; (f) the upstream slope must be protected against erosion by wave action, and the crest and downstream slope must be protected against erosion due to wind and rain; (g) the design must be such that the most severe earthquake that can be reasonably anticipated will not cause catastrophic failure and loss of life; and (h) the dam and its appurtenants must be constructed utilizing proper methods and control.

Earth dams greater than 12,500 acre-feet or a total capacity of less than 25,000 acre-feet measured to the primary emergency spillway must be designed and constructed at least equivalent to the United States Bureau of Reclamation Design of Small Dams to its limit of a 50-feet dam height, and to the Corps standard beyond a 50-feet dam height. Designs for construction of high-hazard dams must conform to accepted practices and procedures of the engineering profession. Design as well as preparation of the construction plans and specifications must be prepared by or under the direction of an engineer experienced in dam design and construction.

ARM 36.14.502 sets forth the hydrologic standard for emergency and principal spillways. The regulation sets forth minimum inflow design flood and the minimum inflow design flood recurrence interval for reservoirs and spillways.

ARM 36.14.503 sets forth certain monitoring instrumentation requirements. All dams must have an adequate seepage monitoring and collection system.

ARM 36.14.504 sets forth requirements for the breach or removal of an earthen dam. The breach of an earth dam must be excavated down to the level of the natural ground and be able to pass the 100-year, 24-hour flood at a depth and velocity equivalent to the natural channel. However, the maximum width required may be the total removal of the dam. The sides of the breach must be excavated to a slope that is stable and consistent with the natural angle of repose of adjacent material abutting the dam or as determined by the engineer.

ARM 36.14.301-312 sets forth dam construction applications and permits. ARM 36.14.306 requires that repair work include specific measures to be taken to reasonably ensure the problem will not recur or the solution is the most reasonable and will not impact the safety of the dam. ARM 36.14.309 requires notification and immediate action to correct a dangerous condition if a dangerous or emergency condition including but not limited to flood during construction, slope failure, or earthquake, develops during construction.

ARM 36.14.401-407 sets forth operation applications and permits. ARM 36.14.404 requires a safe drawdown rate for the reservoir. ARM 36.14.405 requires the removal and prevention of the accumulation of deleterious materials from upstream face of the dam and the spillway system and the maintenance of adequate and suitable vegetation to prevent the erosion of the embankment and earth spillway for the dam.

IV. To Be Considered Documents (TBCs)

The use of documents identified as TBCs is addressed in the Introduction, above. A list of TBC documents is included in the Preamble to the NCP, 55 Fed. Reg. 8765 (March 8, 1990). Those documents, plus any additional similar or related documents issued since that time, will be considered by EPA and DEQ during the conduct of the remedy implementation.

V. Other Laws (Non-Exclusive List)

CERCLA defines as ARARs only federal environmental and state environmental and siting laws. Remedial design, implementation, and operation and maintenance must nevertheless comply with all other applicable laws, both state and federal, if the remediation work is done by parties other than the federal government or its contractors.

The following "other laws" are included here to provide a reminder of other legally applicable requirements for actions being conducted at the MRSOU. They do not purport to be an exhaustive list of such legal requirements, but are included because they set out related concerns that must be addressed and, in some cases, may require some advance planning. They are not included as ARARs because they are not "environmental or facility siting laws." As applicable laws other than ARARs, they are not subject to ARAR waiver provisions.

Section 121(e) of CERCLA exempts removal or remedial actions conducted entirely on-site from federal, state, or local permits. This exemption is not limited to environmental or facility siting laws, but applies to other permit requirements as well.

A. Other Federal Laws

1. Occupational Safety and Health Regulations

The federal Occupational Safety and Health Act regulations found at 29 CFR § 1910 are applicable to worker protection during conduct of all remedial activities.

B. Other Montana Laws

1. Groundwater Act

Section 85-2-505, MCA, (Applicable) precludes the wasting of groundwater. Any well producing waters that contaminate other waters must be plugged or capped, and wells must be constructed and maintained so as to prevent waste, contamination, or pollution of groundwater.

Section 85-2-516, MCA, states that within 60 days after any well is completed, a well log report must be filed by the driller with the DNRC and the appropriate county clerk and recorder.

2. Public Water Supply Regulations

If remedial action at the site requires any reconstruction or modification of any public water supply line or sewer line, the construction standards specified in ARM 17.38.101 (Applicable) must be observed.

3. Water Rights

Section 85-2-101, MCA, declares that all waters within the state are the state's property, and may be appropriated for beneficial uses. The wise use of water resources is encouraged for the maximum benefit to the people and with minimum degradation of natural aquatic ecosystems.

Parts 3 and 4 of Title 85, Chapter 2, MCA, set out requirements for obtaining water rights and appropriating and utilizing water. All requirements of these parts are laws which must be complied with in any action using or affecting waters of the state. Some of the specific requirements are set forth below.

Section 85-2-301, MCA, of Montana law provides that a person may only appropriate water for a beneficial use.

Section 85-2-302, MCA, specifies that a person may not appropriate water or commence construction of diversion, impoundment, withdrawal or distribution works therefor except by applying for and receiving a permit from the Montana Department of Natural Resources and Conservation. While the permit itself may not be required under federal law, appropriate notification and submission of an application should be performed and a permit should be applied for in order to establish a priority date in the prior appropriation system.

Section 85-2-306, MCA, specifies the conditions on which groundwater may be appropriated, and, at a minimum, requires notice of completion and appropriation within 60 days of well completion.

Section 85-2-311, MCA, specifies the criteria which must be met in order to appropriate water and includes requirements that:

1. there are unappropriated waters in the source of supply;
2. the proposed use of water is a beneficial use; and
3. the proposed use will not interfere unreasonably with other planned uses or developments.

Section 85-2-402, MCA, specifies that an appropriator may not change an appropriated right except as provided in this section with the approval of the DNRC.

Section 85-2-412, MCA, provides that, where a person has diverted all of the water of a stream by virtue of prior appropriation and there is a surplus of water, over and above what is actually and necessarily used, such surplus must be returned to the stream.

4. Controlled Ground Water Areas

Pursuant to § 85-2-507, MCA, the Montana Department of Natural Resources and Conservation may grant either a permanent or a temporary controlled ground water area. The maximum allowable time for a temporary area is two years, with a possible two-year extension.

Pursuant to § 85-2-506, MCA, designation of a controlled ground water area may be proposed if: (i) excessive ground water withdrawals would cause contaminant migration; (ii) ground water withdrawals adversely affecting ground water quality within the ground water area are occurring or are likely to occur; or (iii) ground water quality within the ground water area is not suited for a specific beneficial use.

5. Occupational Health Act, §§ 50-70-101 et seq., MCA

ARM § 17.74.101 addresses occupational noise. In accordance with this section, no worker shall be exposed to noise levels in excess of the levels specified in this regulation. This regulation is applicable only to limited categories of workers and for most workers the similar federal standard in 29 CFR 1910.95 applies.

ARM § 17.74.102 addresses occupational air contaminants. The purpose of this rule is to establish maximum threshold limit values for air contaminants under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. In accordance with this rule, no worker shall be exposed to air contaminant levels in excess of the threshold limit values listed in the regulation.

This regulation is applicable only to limited categories of workers and for most workers the similar federal standard in 29 CFR § 1910.1000 applies.

6. Montana Safety Act

Sections 50-71-201, 202 and 203, MCA, state that every employer must provide and maintain a safe place of employment, provide and require use of safety devices and safeguards, and ensure that operations and processes are reasonably adequate to render the place of employment safe. The employer must also do every other thing reasonably necessary to protect the life and safety of its employees. Employees are prohibited from refusing to use or interfering with the use of safety devices.

7. Employee and Community Hazardous Chemical Information

Sections 50-78-201, 202, and 204, MCA, state that each employer must post notice of employee rights, maintain at the work place a list of chemical names of each chemical in the work place, and indicate the work area where the chemical is stored or used. Employees must be informed of the chemicals at the work place and trained in the proper handling of the chemicals.

Milltown Reservoir Sediments Operable Unit

of the Milltown Reservoir/Clark Fork River Superfund Site

Record of Decision

Appendix B:
Concurrence Letter from the State of Montana

U.S. Environmental Protection Agency Region 8

10 West 15th Street
Suite 3200
Helena, Montana 59626

December 2004

Montana Department of
ENVIRONMENTAL QUALITY

Judy Martz, Governor

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.state.mt.us

December 9, 2004

John Wardell, Director
Montana Office
U.S. Environmental Protection Agency
Federal Office Building
10 West 15th Street, Suite 3200
Helena, MT 59626

Dear Mr. Wardell:

DEQ concurs in the Record of Decision for the Milltown Reservoir Sediments Operable Unit and commends EPA for its constructive approach in recognizing integration of natural resource restoration actions with the remedy. Integration of restoration actions will allow a variety of benefits for all concerned, including cost-savings, enhanced protectiveness, a more natural environment, improved fish passage, and greater recreational opportunities, not only within the operable unit but upstream and downstream as well.

DEQ is the state agency authorized to perform the support agency consultative role under CERCLA and the NCP. The State's performance of restoration actions and certain other consultation functions involves various other state agencies and the Governor, as the natural resource damage trustee under CERCLA. Accomplishing integration of restoration, as well as many of the details involved in the Milltown cleanup, will require additional agreements including these other state participants. We look forward to working with you, the other state and federal agencies involved, and the responsible parties to see that the cleanup plan for Milltown is fully, quickly, and effectively implemented.

Sincerely,

Jan P. Sensibaugh

Jan P. Sensibaugh
Director